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# REPORT

OF THE

# SELECT COMMITTEE APPOINTED BY THE HOUSE OF COMMONS

TO OBTAIN INFORMATION

AS TO THE

# AGRICULTURAL INTERESTS

OF

# CANADA.

Printed by Order of Parliament.

OTTAWA:
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# THE ENCOURAGEMENT

OF THE

# AGRICULTURAL INDUSTRIES.

HOUSE OF COMMONS, WEDNESDAY, 23rd January, 1884.

*Resolved*,—That a Select Committee composed of Messrs.

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| Mr. Bain (Wentworth), | Mr. Irvine, |
| " Bergin, | " Landry (Montmagny), |
| " Fisher, | " Massue, |
| " Foster, | " [illegible], and |
| " Gigault, | " Orton, |

be appointed to inquire into the best means of encouraging and developing the Agricultural Industries of Canada, and to report thereon to The House, with power to send for persons, papers and records.

Attest, J. G. BOURINOT,
Clerk of the Commons.

TUESDAY, 19th February, 1884.

*Ordered*,—That the said Committee have leave to employ a short-hand reporter to take down such evidence as may be necessary.

Attest, J. G. BOURINOT,
Clerk of the Commons.

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# THE ENCOURAGEMENT

OF OUR

# AGRICULTURAL INDUSTRIES.

HOUSE OF COMMONS, WEDNESDAY, 30th January, 1884.

*Resolved,*—That a Select Committee composed of:—

Mr. Bain (Wentworth),
" Benoit,
" Fisher,
" Foster,
" Gigault,
Mr. Irvine,
" Landry (Montmagny),
" Massue,
" McDougald, and
" Orton,

be appointed to inquire into the best means of encouraging and developing the Agricultural Industries of Canada, and to report thereon to The House; with power to send for persons, papers and records.

*Attest,* J. G. BOURINOT,
*Clerk of the Commons.*

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TUESDAY, 19th February, 1884.

*Ordered,*—That the said Committee have leave to employ a shorthand reporter to take down such evidence as may be necessary.

*Attest,* J. G. BOURINOT,
*Clerk of the Commons.*

# REPORT.

The Select Committee appointed by the House of Commons to enquire into the best means of encouraging and developing the Agricultural Industries of Canada, beg leave to report that they have made a careful enquiry into the disadvantages and wants experienced by agriculturists, that it was considered could be in any degree removed or supplied, by more extended and attentive action on the part of our Legislature and Executive. For the purpose of this enquiry, the Committee have taken the evidence of persons who have made special studies of the various branches of industry comprised under the more general term agriculture, of others possessed of wide scientific knowledge having a direct and important bearing upon agriculture, of whom some by travel and observation were able to afford the Committee much valuable information of the effect of operations for the encouragement of agriculture in other countries, and of others who, being practical Canadian farmers, were well prepared to express the general feeling as to the wants and disadvantages experienced by agriculturists in Canada. The evidence given by these gentlemen has greatly aided the Committee in forming conclusions that they believe will be found to be perfectly justified by experience elsewhere, and also abounds in information of a nature that renders it well worthy the careful perusal of agriculturists generally throughout the Dominion.

Before taking their evidence the Committee issued a series of questions, a form of which is herewith presented, to agriculturists in all parts of the country, in order to ascertain the views of that class generally.

OTTAWA, February, 1884.

SIR,—A Special Committee has been appointed by Parliament to consider what steps should be taken to place the Department of Agriculture in a position to better promote and encourage the Agricultural Industries of the country. The Committee being anxious to become possessed of the advice and experience of men engaged in the culture of the soil, as well as of those devoted to the study of sciences having a practical bearing on agriculture, begs to solicit your co-operation, and to request that you will express your views on those of the following questions with which you feel prepared to deal. Enclosed is a printed envelope for reply, which the Committee would be pleased to receive at as early a date as possible.

I am, &c.,
G. A. GIGAULT,
*Chairman of Committee.*

1. Under what difficulties does the present system of agriculture labor, and in what respect is the Canadian farmer placed at a disadvantage when competing in foreign markets?
2. What deficiencies have come under your notice in the—
   Cultivation of cereals,
   Cultivation of roots and grasses,
   Raising of stock and wool growing,
   Production of butter and cheese,
   Culture of fruit,
   Fertilizers in ordinary use?
3. Would the importation of seed from foreign countries benefit our farmers?
4. Would a general system of inspection and branding be likely to enhance the value of our butter and cheese in the home and foreign markets?
5. Would the importation of fruit tree scions and plants from Russia and other countries under climatic conditions similar to those of Canada, be of service to our fruit growers.
6. Would the appointment of a public analyst, to whom samples of soil and of home manufactured and imported fertilizers might be submitted, prove of advantage to our farmers?

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7. Would the establishment of an experimental farm or garden where varieties of foreign grain, fruits, trees and fertilizers might be tested, and whence such seeds, plants, &c., might be distributed throughout the Dominion, be advisable?

8. Have you noticed any appreciable deficiency in the crops of your district owing to the depredations of birds and insects?

9. What crops and fruit products have suffered most, and from what classes of insects or birds?

10. Have any, and what, steps have been taken in your district to keep down insects and birds injurious to vegetation?

11. Can you furnish the Committee any details as to the amount of loss sustained by agriculturists in your locality from bird or insect pests infesting grain, clover, onions, turnips, potatoes, pease, beans, cabbages, tomatoes, squashes, apples, pears, plums, grapes, strawberries, currants, &c.?

12. Have the timber trees in your district suffered from any of these destructive agents?

13. Would the appointment of an Entomologist, whose duty it would be to give information concerning birds and insects (injurious and beneficial) and the means of protecting the crops against their ravages, accomplish any benefit to the farming classes?

14. Would it be desirable to extend the duties of the present system of veterinary inspection of stock in quarantine, and, if needful, the staff also, with the view to deal with the local development of infectious diseases among farm stock and poultry throughout the Dominion, and the best means of stamping them out?

15. Is there in your neighborhood sufficient standing timber to supply shade, fuel and other domestic wants?

16. Have any steps been taken to maintain this supply, or to replant where it has failed?

17. Do you know of any attempts to introduce tree planting for timber purposes, what varieties and area were planted, what were conditions of the soil, what have been the results, and to what do you ascribe the success or failure of those attempts?

18. Would the establishment of a Central Bureau, having for its object the collection of information upon all matters relating to agriculture, and having a skilled staff capable of giving advice, making experiments, and noting the improvements effected in other countries that might might be advantageously introduced into the Dominion, be a benefit to our agriculturists?

19. Would the dissemination of handbooks and reports containing the data thus collected, on culture, stock-raising, dairying, poultry keeping, &c., have a beneficial effect?

20. Would you recommend in this connection the formation of a section devoted to agricultural statistics, showing the acreage under the different corps, the movements and prices of grain, cattle, &c., rates of transportation, fluctuation of foreign markets, &c.? And what advantages might be expected to accrue therefrom to the producer?

21. Would the issue of monthly bulletins and abstracts containing such information be of sufficient advantage to warrant their publication?

22. Does your experience enable you to offer any further suggestions whereby such Central Bureau might be utilized to promote the agricultural interests?

About 1,500 copies of the Series were mailed to addresses furnished on application by members of the House of Commons, to which 385 replies have so far been received. The leading subjects referred to in the answers and evidence are deficiencies in the cultivation of cereals, roots and grasses, stock-raising and wool growing, dairy productions, fruit culture, fertilizers, &c.; importation of seeds, fruit tree scions and plants from countries under climatic conditions similar to ours; the establishment of an experimental farm, the ravages of birds and insects and the appointment of an Entomologist, the establishment of a Central Bureau of Agriculture, with a section devoted especially to statistics recording acreage under crop, movements and prices of produce, rates of transportation and condition of foreign markets, &c.; and the publication of such information by the frequent issue of bulletins and abstracts, and the dissemination of information on the various branches of agriculture through the medium of handbooks, reports, &c.

An examination of the replies to the questions sent out sustains the view that more thorough agricultural knowledge generally—particularly of the kind of crops most suitable to the various soils and the most economical and efficient methods of production—is the great hindrance to progress in agriculture. This is owing mainly to the absence of sufficient means of information or the difficulty of obtaining it, and in many cases to the neligence of the farmers themselves. The fact must not be overlooked that farmers could derive instruction and suggestions of inestimable value from our excellent agricultural periodicals, were it not for a lack of appreciation of their value and very misdirected notions of economy.

According to the answers received, it appears there is a large amount of defective farming in the country, notwithstanding the great progress made in recent years. In the cultivation of cereals, roots and grasses the chief deficiencies are want of periodical change of seed and its right selection, and proper rotation of crops, with lack of thorough tillage and knowledge of the value and suitability of manures. The value of manures is in many cases overlooked, and much fertilizing power is lost through negligent exposure and the waste of liquid manures. In stock-raising the chief deficiencies are want of more pure-bred males, lack of knowledge of adaptability of breeds to particular conditions throughout the Dominion, want of better pastures and insufficient tree shelter. In the production of butter the milk is frequently not properly cared for, nor is suitable attention paid to the selection of milch cows, and the food given is often deficient in nutriment and milk-producing qualities. Low grades of butter are also very largely attributed to want of skill and scientific knowledge in its manufacture, and want of improved apparatus. In cheese making a want of skill and scientific knowledge is also felt. The quality of rennets is neglected, and proper thought is not given to the suitability of the materials used for packing. Several answers point out that the buildings used for cheese factories are too lightly constructed to afford adequate protection against atmospheric changes. In the cultivation of fruit a great want is experienced, in many sections, of hardier varities and of varities with improved keeping qualities. There is also a deplorable want of knowledge regarding the insects and diseases to whose attacks fruit trees are so much liable. It is believed the fruit industry might be made much more profitable and general by the introduction of other suitable varities, and by a liberal dissemination of information respecting insects and diseases of fruit.

A careful summary has been prepared of the views expressed in the answers upon the most important of the questions submitted, and is given herewith :—

| No. of Replies. | | Establishment of Experimental Farm. | | Appointment of Entomologist. | | Establishment of Central Bureau. | | Section devoted to Statistics. | | Handbooks and Reports, and Issue of Bulletin. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | For. | Against. | For. | Against. | For. | Against | For. | Against. | For. | Against. |
| Ontario | 169 | 121 | 33 | 85 | 55 | 109 | 32 | 95 | 31 | 100 | 26 |
| Quebec—(English) | 35 | 20 | 8 | 18 | 10 | 21 | 6 | 20 | 2 | 21 | 4 |
| do (French) | 89 | 68 | 14 | 56 | 24 | 64 | 17 | 41 | 33 | 76 | 8 |
| Nova Scotia | 59 | 46 | 6 | 27 | 21 | 41 | 4 | 35 | 7 | 36 | 8 |
| New Brunswick | 25 | 15 | 3 | 10 | 5 | 18 | 3 | 18 | 1 | 18 | 2 |
| Prince Edward Island | 7 | 7 | ........ | 2 | 1 | 3 | ........ | 2 | ........ | 4 | ........ |
| Manitoba | 0 | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ | ........ |
| British Columbia | 1 | 1 | ........ | ........ | 1 | ........ | ........ | ........ | ........ | ........ | ........ |
| Total | 385 | 278 | 64 | 198 | 117 | 256 | 62 | 211 | 74 | 255 | 48 |

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A large proportion of the answers regard the proposal for an experimental farm so favorably as to advise, not only a central one, but branch farms in every Province. The current of opinion, as shown in these replies, is very strong in favor of the Central Bureau and the experimental farm.

The Committee orally examined fourteen witnesses upon various subjects falling within the scope of the enquiry intrusted to them. Their evidence was carefully reported by a shorthand writer, in order to its preservation and publication if the House approves, but it is deemed desirable to emphasize portions of it by a brief review, with occasional extracts from the evidence and the answers to questions already alluded to.

### HORTICULTURE.

The fullest evidence on this important branch of agriculture was given by Mr. Charles Gibb, of Albottsford, P.Q., a gentleman who has, perhaps, devoted more attention to fruit culture than any other Canadian. Mr. Gibb has travelled extensively in Europe in search of varieties of fruits suitable to our climate, and has published many works upon both home and foreign fruits. Statements by Mr. Gibb, therefore, carry with them all the influence that experience and knowledge of the subject can furnish. Regarding our lack of hardier varieties of fruits in Canada, Mr. Gibb says:—

"We have our drawbacks in the way of fruit culture in the greater part of Canada. We are north of the limits of the successful culture of the fruits of western Europe, and it is only those occasional fruits which have, for some reason or other, some northern blood in them—some northern ancestry—that can be grown in our colder climate, so that we are compelled to go to the old world and to the cold climates of that world for our fruits.

* * * * *

"Q. Do you think there are more varieties of fruits in Russia than here, and that we can increase our variety by importing fruits from Russia?—They are growing the apple there in great quantities. Now, for instance, take the Government of Kazan, 400 miles east of Moscow, 600 miles furter north than this, with the extremes in the matter of climate, a warm summer and dry, steady winter. It is a point to which Crookston or Fergus Falls on this continent would correspond. There we find the apple grown in twelve peasant villages to the value of about $50,000 per annum. The thermometer had been down to 40 degrees below zero the winter before we went there, yet the trees were full of apples. The thermometer had been down to 52 or 56 five years before, and there were no signs of winter killing on those trees. Now the fruits of that region must be of great value to parts of our North-West. I do not want to be too sanguine about the North-West. I hope we can grow fruit there; but we are going to fail in some of our first attempts, because we do not know how to grow it there. As I say, those fruits that are growing in climates so much colder than our own ought to be introduced there. Then, as regards the pear. I saw pear trees at Saratof, where the winter temperature is one degree milder than at Quebec, and they were in good health. Then, when you come to the cherry, in the district of Vladimir, just east of Moscow and a little north of it, where the winter temperature is three degrees lower than it is at Quebec, they grow a cherry in such quantities that full cars of it, and at times entire trains, are shipped. At all events it floods all the markets, and yet the winter temperature of the climate in which it grows is much lower than that of Quebec. That brings up the query whether such fruits should not be introduced into Canada, not for limited trial, but for something more than limited trial, because if we had it, it would lead to another industry, that of canning the fruit, which would be worth having. There are plums grown in those regions of the German prune type, of good quality. At the same time, whether they or an improved variety of the wild plum of the North-West will be the plum of the future for us, is a question. There are still other fruits grown there that we can grow; for instance, take the mulberry. There are mulberries in Mongolia, Central Asia, growing in colder regions than those in which the Russian mulberry is found. There are also mulberries of fine quality growing in Amur, on the Pacific coast. So that we should increase our area of that fruit. Then we come to the apricot. The apricot is growing on the Altai Mountains, between Turkestan and Southern Siberia, at a high elevation and in a cold climate. * * * Judging by the Russian fruits we have seen and tested, we know we can, in the climate we have, increase the area, northward, of fruit culture on this continent."

Mr. Gibb's evidence is sustained by that of Prof. Penhallow, professor of botany in McGill College, Montreal, a gentleman who also has travelled extensively, who spent some years in Japan, and who has made a close study of fruits and their diseases. Prof. Penhallow says :—

"It is by bringing in from other countries the fruits which are peculiar to them, and which may be adapted to our particular wants here, that we get a greater variety of fruits. Besides, in so doing, we could get fruits which might mature at different seasons, and which would vary in their keeping qualities. The great difficulties where we have not a large range of varieties is, that the fruits mature at the same time, or that their keeping qualities are the same."

Mr. Wm. Saunders, of London, Ont., chemist, President of the Ontario Entomological Society, author of a valuable illustrated work on "Insects injurious to Fruits," and a large orchardist, also says :—

"In the cultivation of apples in the more favored districts of our Dominion, much loss is occasioned in years of plenty from the abundance of autumn-ripening fruits, the markets being glutted. The majority of orchards hitherto planted have contained too large a proportion of such fruits. Farmers need to have this impressed on them. The difficulty may be remedied by top-grafting with winter apples. In the colder sections there is a great want of hardier varieties of all sorts, which will better withstand the severities of the climate. This might be accomplished either by the introduction of hardy varieties from other cold countries, or the production here of new varieties by judicious cross-fertilization and selection. Many of the special fertilizers now sold are frauds, and there are but few where the farmer who purchases them gets value for his money."

We return to the evidence of Mr. Gibb. In reply to the question : "Do you think the Government should establish an experimental station, or an experimental garden ?" he says :—

"Suppose we had something of that kind started here, we would not need more than ten acres of ground, but it would be safe to have ten acres alongside, which we could get if we wanted to make the station twenty acres. Then we would need to import certain trees—some from Russia, some from northern China, and some that we could get from Ames, Iowa. That is, we should import them from cold climates. We should propagate those enough to get them scattered in the country. Then for the experimental orchard we should have three trees of each kind planted in it. That is not an expensive work, and the great beauty of the thing is, that we know now what to import. We are not working in the dark now ; we know what to import, and we know that our work is one of certain success."

The following remarks by Prof. Penhallow, on the subject of diseases in fruit, suggest a highly important and useful work that might be performed by those connected with an experimental fruit garden, as that advocated by Mr. Gibb :—

"The principal difficulty is the want of knowledge of the proper methods of combatting diseases. I may mention incidentally that we have insufficient knowledge in regard to the varieties of fruits which may be adapted to given climates, but principally the deficiencies are to be found in the knowledge of the diseases attacking fruits. While there are many insect depredations, yet the injuries which I principally refer to now would be those arising from the action of vegetable parasites or other diseases introduced by deficiencies in food. This question has of recent years demanded very prominent attention and it has received very careful consideration."

The loss sustained by farmers in many sections of the country by the introduction of unsuitable trees from United States nurseries is particularly mentioned by Mr. Julius L. Inches, Secretary of the New Brunswick Board of Agriculture :—

"Cultivation of fruit is becoming very general in New Brunswick. Great loss was sustained by unsuitable trees from United States nurseries. Home-grown and grafted trees are more successful." Regarding the importation of suitable trees and scions from Russia and other countries under climatic conditions similiar to ours, Mr. Inches says: "The introduction of suitable trees and scions would be very valuable, but each kind should be tried by suitable persons before many are sent through the country. The loss of the trees is as nothing compared with filling the country with poor fruit that people don't like to cut down and are not worth the space and labour of continuing to care for them."

The Committee think the foregoing extracts of great importance as indicating the needs of Canadian horticulturists and the most effective means of supplying those needs. It is hardly necessary to point out that it would be impossible for mere private enterprise to deal with the subject of introduction of new varieties of fruits on such a scale as would meet the necessities of the case. Left to private enterprise alone, progress in fruit culture will necessarily be but gradual.

### EXPERIMENTAL FARM.

The question of the establishment of an experimental farm being, in the estimation of the Committee, one of great importance, they have carefully endeavoured, as far as time would permit, to ascertain to what extent such institutions are employed in other countries and how their operations are regarded. In our own country public sentiment appears to be very strongly in favor of the establishment of an experimental farm, with branches in the Provinces, where differences of climate render them advisable, 278 of the replies so far received having favored such action, and only 64 having expressed a contrary opinion. In a report published in France in 1882 as to the merit of experimental farms or stations, in *Le Journal d'Agriculture Pratique*, by Mr. P. Joigneaux, a member of the Agricultural Commission, we find the following words: "Their usefulness can no longer be disputed. The farmers can no more dispense with them than we can dispense with the services of physicians in cases of sickness or of men of law in litigious matters."

In 1868 Mr. L. Grandeau was commissioned by the Minister of Agriculture of France to study on the spot the agricultural stations of Germany, and to address to him a report on the working of these institutions, on the services which they render to the German population and as to the advantage there would be to French agriculture by encouraging the creation of analogous establishments.

When he returned from his missions, Mr. Grandeau thus wrote to *Le Journal d'Agriculture Pratique*:—"Starting for Germany with the idea that there was much to be done in order to impart to French agriculture, by teaching, and with the aid of chemistry, a movement that would produce the happiest results, I found at every step that my convictions on this subject were confirmed, and on returning to France, I was full of admiration, it is no exaggeration to say, for the agricultural institutions of Germany. There, the societies and schools of agriculture and the agricultural stations are in a flourishing condition. Almost all of them are well organized and have at their disposal revenues and subsidies, which enable them to provide abundantly for every requirement. In a word, and why should I not declare it? Beholding those institutions so well advanced, and so effectively patronized by individuals and by the State, I could not help animadverting on what exists among ourselves, or to speak more correctly, on the absence of analogous institutions in our country.

"I was not less painfully affected when I visited the laboratories and experiment fields for agriculture in Germany. There, everywhere life, labour without bustle, but active and productive, essays on every kind of artificial and natural manure, meetings of practical people and learned men, at which are periodically discussed questions suitable to the time. Of all this we know nothing or next to nothing in France. Agricultural societies languish notwithstanding the good will of some of their members. Our agricultural committees limit their operations almost exclusively to the distribution of bounties and medals. There is nothing in all this calculated to impart to our agriculture a truly fruit-bearing movement. This cannot be changed or modified by the isolated efforts of some learned men and a few practical people. It is necessary, above all, that the great body of agriculturists should be convinced by facts of the extreme importance, to-day more than ever, of cementing the alliance of science with practice. At whatever cost, our farmers must be made familiar with the art of experimenting. In a word, it is henceforth indispensable that agriculture, which in our country has been hitherto exclusively a science of observation, should become, at the same time, an experimental science. At this price and at this price only, can be reached better conclusions which will be more abundantly remunerative, and which will more than compensate the increased labour which the husbandman will undertake in following the new order.

"If the preceding reflections are well founded, and if we are not deluded as to the direction which French agriculture ought to receive, it is no difficult task to reach the conclusions which follow from the principles laid down above. On the one hand must be brought to the knowledge of practical farmers the results of agricultural researches undertaken in laboratories and experiment fields; on the other, it is important, as M. E. Lecouteux recently said, to stimulate immediately the creation of the greatest possible number of experiment fields in agricultural clearings."

At a later date, 20th September, 1877, M. Grandeau wrote to the same journal:—

"The station comprises both a scientific establishment, the value and reputation of which depend on the qualities of the learned man who is at the head of it, and a laboratory, where the proprietors, farmers and manufacturers of the neighborhood go to make, at their own cost, such analyses and researches as they may require.

* * * * * * * *

"Between 1852 and 1860 the German stations were almost all constituted on the same plan. The principal object of the scientific department was to study the nutrition of plants and the influence of manures. An experiment field and a laboratory for analyses constituted the means for study. Not long after the study of animal nutrition took the place which was claimed for it by the importance of cattle in agriculture. Hence the first step towards speciality. Each station continued to make analyses for the public and to carry on the manufacture of manures. But whilst some developed their experiment fields and erected special constructions for the study of the nutrition of vegetables, others applied particularly to animal physiology. A stable for experimenting and respiratory apparatus took the place of the experiment field for the study of soils and manures.

"The two branches of agriculture (cultivation of the land and care of cattle) were, then, in Germany provided with scientific institutions, where the husbandman could obtain information, such as he required, for guiding him in the cultivation of his land.

"The manifest demonstration of the profit resulting to agriculture from the union of chemical science and physiological experiment which was realized at the stations made impression, every day, more and more, on pratical farmers. Their mistrust of those whom they call the learned lessened from day to day, and they hastened to come to ask, at the station, counsel and instruction as to those things in their daily labors or which they most wanted information. From this confidence in science and the new services which it renders to the farmer in enlightening him as to the facts which he observes without being able to explain them, arose the *specialization* of the stations.

* * * * * * * *

"If it be desired to group the several stations now in existence, according to the special services which they render to the practical cultivator, we conclude by classing the establishments in the following manner:—

*Direction of Scientific Researches.*

Number of stations devoted to these specialities—

| | |
|---|---|
| Studies on soil in general......................................—.......... | 16 |
| Essays in culture and manuring (experiment fields)............... | 24 |

| | |
|---|---|
| Cultivation of the vine and manufacture of wine | 13 |
| Cultivation of fruit | 3 |
| Study of forestry | 9 |
| Researches in vegetable physiology | 28 |
| Diseases of vegetables | 11 |
| Researches in animal physiology and feeding of cattle | 20 |
| Stations for milk and cheese | 11 |
| Accessory agricultural industries | 5 |
| Sugar factories | 3 |
| Distilleries | 2 |
| Breweries | 2 |
| Researches in technical chemistry; manufacture of manures; ivory black; tanneries | 22 |

In France in the year 1878, twenty-five experimental stations were subsidized, viz:—

| | | |
|---|---|---|
| Station of Nice | 2,500 | francs |
| " Caen | 1,750 | " |
| Laboratory of Cantal | 3,500 | " |
| Station of Bourges | 1,000 | " |
| " Montpelier | 16,467.50 | " |
| " Vincennes | 10,000 | " |
| " Grignon | 6,000 | " |

And eighteen other stations which received each an appropriation varying from 500 to 3,000 francs.

Prof. Penhallow, in his evidence, made the following statement in reference to experimental farms in Germany:—

"The first movement which occurred in Germany leading to the establishment of their experiment stations was brought about through the efforts of the farmers themselves. Up till 1850 there were no institutions which were qualified to carry on investigations of a scientific character which could be applied to agriculture. The farmers of certain portions of Germany began to realize that their future success depended very largely upon more exact knowledge, as obtained from scientific research. So in 1852, in Saxony, a local farmers' club organized, by their own efforts and at their own expense, a small experimental station. They placed that in the hands of a University graduate; I believe it was Dr. Wood, who has since given us such valuable results in his scientific work. In two years' time that station had so thoroughly demonstrated its usefulness and its importance that the Government recognized it, and not only recognized it, but extended to it very important pecuniary support. The work of that station, which was then extended, came to be recognized as of great importance to the country at large. Since then, as the results of that early movement, there have been established, within the last thirty years, over eighty of these stations. Nearly all of them receive at least a measure of support from the Government, although many of them are still largely supported by private subscription or local societies. I think it is exceedingly significant, as showing the importance and the value of these stations, that the farmers themselves should initiate the movement, and that it should come from them rather than from the Government.

* * * * *

"These stations have given material which is not only of the highest scientific value, but of the highest value in the direct promotion of agriculture as a science; indeed, we can attribute to their work almost all the exact knowledge we have at the present time concerning the careful breeding, management and feeding of stock, the growth and nutrition of plants, the special requirements of plants, the adaptation of plants to soil, the sources of plant food, and other questions of a similar character, which are exceedingly numerous.

* * * * *

"The knowledge gained in these stations is disseminated by means of annual reports. These reports embrace only the most important portion of the work done; they embrace that which may be regarded as established. In other words, it includes what would be the foundation of laws on different subjects. Aside from those reports, a very large amount of information is distributed also through the medium of bulletins, which are issued at frequent intervals, as material is collected and occasion may demand. But the material which goes into these bulletins is carefully regulated, and nothing is allowed to go into them which should more properly go into the report at the close of the season."

Speaking of experimental farms in Japan, Prof. Penhallow said:—

"In Japan they have no true experiment stations, although they have large experiment farms, which have been established with direct reference to the importation and testing of improved farm machinery, farm stock, and fruit and forest trees. These farms have been established chiefly within the last ten years, and almost entirely in the northern portion of the Empire, in the island of Yeddo, where they have desired to make special efforts in the development of agricultural resources. There have been one or two farms established on the main island, in Tokio and vicinity, but they are more of the nature of farms subordinate to those in the north.

"They have imported large quantities of fruit trees. The number of desirable fruits known to Japan before recent foreign intercourse was exceedingly limited. They established a large garden at Tokio for the testing of imported fruit trees, and from that centre they have distributed fruits, including plums and cherries. Throughout the northern island of Yeddo there are now numerous, and in some cases large orchards, which have been established in this way. Not only that, but they have developed a large area in vineyards and hop culture. There, we have a very direct and valuable outcome of the work which can be performed by these experiment stations, or more properly, in this case, by trial grounds."

Prof. Wm. Brown, C.E., P.L.S., of the Ontario Agricultural College, Guelph, gives the following interesting statement concerning the working of the experimental farm in connection with the College:—

"I shall take up the subject in the order given in your communication:

"'(*a*) Give the Committee your opinion of the results of your experimental farm upon the agricultural and stock-raising interests of Ontario.'

"While it takes more time to evolve anything in farm cropping than in live stock development, this farm, by its ordinary practice, as well as through purely scientific research, has already done considerable for the country. In practice, it has introduced and distributed several new cereals that have stood their time fairly well, and the value of this subject is now more evidenced than it ever has been, by the fact that, with no wheat, oats or barley on hand to recommend, the very numerous applications for them are causing disappointment. So strong has this feeling become that I have just forwarded a recommendation to the Ontario Legislature, of which the following is an extract:—

"'Ontario may have to take a second place in the extensive and cheap production of cereals, because the possession of the country westward being in some respects a repetition of our own life, will produce cheaper, and maintain plant excellence better than older lands can do. This new feature of our Domminion agriculture must be acknowledged in Ontario practice, and that practice made to tie with it. This position does not imply that Ontario must give up her wheat area, or that the proper maintenance of varieties must be abandoned. I think on the contrary, that it devolves on us more than ever, to give attention to these. Under the increasing fertility of our older lands, by the better system of farming, and larger number of live stock kept per acre, Ontario is as able as ever to grow perfect wheat, both winter and spring varieties. The fine old Soule and Fife have left us meantime—not for want of proper nourishment in climate or soil, but simply, because in the regular course of their day, as cultivated plants, they require a change. We did not allow them that thorough recuperation, by change to other climates and soils, which alone affords new life, and hence serious disappointments and loss are too often charged to other causes. It comes as an interesting point in these considerations, whether our North-West Territories will send us back the Fife, Club and White Russian, so invigorated as to give us another lease of a quarter of a century. Meantime, something else must be done.

"It is considered to be the duty of the Legislature, in connection with this experimental station, to maintain a system of grain testing, for ourselves, as well as for others. I am of opinion that Ontario, by all her physical conditions, is better adapted for this purpose than any other position on the American continent. European and United States experience says, that the change of seed most suitable for them and us is from Southern Russia and Hungary, which have a climate in more respects resembling Canada than any other country. The isothermal of 45° joins Ontario and the Black Sea district, which is still so famous for sound wheats.

"A good deal has been attempted during the last ten years, in introducing new wheats from the United States, both by private enterprise and this experimental farm, but with few exceptions, they have failed, or were but short lived. This was a natural consequence of *bringing from south to the north.* The work must be accomplished through equal, or no more severe climatic conditions, than the country proposed to be benefited, so that further attempts from the United States may be looked upon as fruitless. We should at once begin the purchase of wheat from Europe, not only for experimental testing here, but immediate distribution throughout the Province. For this purpose I ask that $3,000 be placed in the Estimates for 1884, and that means may be taken for a proper selection, by a competent person, so that the fall of 1884 and spring of 1885 may be fully provided for, in chosen parts of the Province.

"From this your Committee will realize how much importance is still attached to the proper maintenance of cereals. Then again, this station has very prominently drawn the attention of farmers to the importance of permanent pastures, and by a careful series of trials has now shown what varieties of grass and clover are best for the purpose. The result is that very many, in other Provinces as well as Ontario, have followed our directions, with a most gratifying success. The success has been such as to call forth high commendations at public meetings, and a Senator of the Dominion lately said to the writer, that what the Ontario Experimental Farm had done in this respect goes a long way to cover all its expenses.

"So also in regard to green fodder as aids to pasture, and special lines of feeding. This farm has very distinctly shown what can be done by the average farmer. In the case alone of the clover called Lucerne, we have many followers, who are much satisfied with the results. These, among others, are evidence of what we have done in farm cropping.

"In more pure experimental work our record has been as yet introductory and questioning—the inevitable of all experimental stations with a nine years' history only.

"The great question of the times, in Europe especially, is the value of special fertilizers. To this we have devoted more than ordinary attention. The future may show something that is at present undeveloping in our experience, but meantime, I take the position, that the light thrown on our practical tests in the use of apatite, gypsum, and others, in the production of farm crops, goes to establish what might be matter of gratification to the country, that its wonderfully fertile climate, in conjunction with system and the best management and use of farmyard manure, renders the extensive use of special fertilizers comparatively valuless. I am aware that such an opinion will be challenged, and many cases cited in contrary proof, but in this, as in other things, marked exceptions are not wanting.

"In making prominent the stock-raising interests of the country, our farm has not only done more than among crops, and manures, but has actually held the lively interest of the United States, Australia and Europe during the last eight years. This has resulted from:—

"1. Introducing new breeds of cattle not previously known in the Province.

"2. In feeding and fattening their crosses with the common cattle upon sound scientific and practical basis.

"3. In pointing out their special properties and adaptability to particular objects.

"4. In so breeding and feeding the pure-breeds for sale as to command the confidence of the people.

"As the agent of the Ontario Government in this work, I have been highly gratified at the success, and the response thus furnished is but a touch of the immense field open to the Dominion. As part of the same, we have been making careful experimental tests as to the value of many forms of feeding materials; not only with those at home, but others from Europe and the States, so that to date we hold some facts of practical importance in connection with the maintenance of animal life, particularly during our very distinct winters."

Prof. Brown subsequently sent the following letter, embodying an important suggestion:—

"ONTARIO AGRICULTURAL COLLEGE, GUELPH, 9th March, 1884.

"GENTLEMEN,—I beg you will allow this letter to form part of my answer to question (*b*) in reply to yours of the 18th ult., as, on further consideration, I consider the subject a very important one.

"During the last three years, very many young monied men have come from Europe to the Dominion in view to acquiring land—principally for raising fine stock. To prepare themselves for this they have either applied to the Ontario Experimental Farm, or to some good farmer in Ontario. We have refused admission to over eighty during that time, and the facilities with farmers have failed to meet the requirements. It is a fact, at the present moment, that this College could easily be filled with students from England and Scotland alone at a handsome fee.

"Should Canada ignore this, even allowing that several would settle in the United States? The destination of most of these young men is our North-West.

"I beg to suggest, therefore, that your Committee recommend the establishmenp of a farm in a conveniently situate part of the North-West, on a small scale, susceptible of convenient extension at any time, where young men should receive instruction in live stock matters only; where specimens of all the leading breeds of cattle, sheet and horses would be kept for education as well as for sale; where two professors only would be necessary—one as Principal, and teaching all the characteristics and practical handling of live stock, with a veterinary surgeon as assistant.

"I am satisfied that were such a station opened next year, properly advertised, and first-class management employed, not less than *one hundred* applications would be received.

"Allowing as low a fee as $100, irrespective of board, the $10,000 as immediate revenue would surely be encouragement enough, and, of course, the greater *Dominion aim* would be settlement of lands by those well prepared on the speciality.

"Any such enterprise by a company, or an individual, would not secure the confidence, nor possibly the ability, that a Government can.

I have the honor to be, gentleman, your obedient servant,

WM. BROWN.

The Special Agricultural Committee, Ottawa,

Much more information of value respecting experimental stations will be found in the evidence of Mr. Gibb and Mr. Thayne in the appendix, which the growing length of the report prevents making direct extracts from.

The views of the great majority of the replies to the questions sent out, bearing on this subject, are well expressed by the following, selected from the replies of leading individuals:—

Mr. D. W. Beadle, nurseryman, of St. Catharines, Ontario, says:—"Most certainly. I believe Canada is the only British colony that has no botanical garden, and this, in fact, is a standing disgrace to our civilization."

Mr. Julius L. Inches, Secretary of the New Brunswick Board of Agriculture, says:—"I have no hesitation in recommending such a farm, and think it would be most beneficial. I have recommended that something of the kind should be added to our Government stock farm."

G. Laroque, Esquire, M.D., of Beaumont, P. Q., writes on the subject:—

"The establishment of experimental gardens or farms is not only useful but indispensable to the advancement of agriculture. Under the direction of instructed, able and practical men, these establishments render immense service in all countries where they are to be found."

Rev. M. Choquette, Professor of Chemistry, in the College of St. Hyacinthe, writes, in reply to the questions of the Committee:—

"As to experimental farms or schools, I deem them absolutely necessary to the progress of agriculture. In France, in Belgium and in Denmark, each station has one of these schools: in these schools our authorities in agricultural science and economy have studied, tested and formulated the rules, a careful attention to which has so greatly contributed to the good reputation and prestige of agriculture in those countries. These experimental stations would, above all, be of great assistance to the butter and cheese industry."

P. R. Pelletier, N. P., farmer, of St. Césaire, writes:—

"The establishment of such a farm or garden would be of great benefit to us. I may, in fact, say that it is for us a thing absolutely necessary and essential."

Hon. H. G. Joly, of Quebec, says in answer to question 7:—

"Yes; with good and intelligent management, such a farm would render great service. It is not easy for our farmers to make such experiments, even if they were willing and able to risk them, but they would watch them with much interest and would not be slow in appreciating the results and benefitting by them."

Mr. J. M. Browning, of Longueuil, Vice-President of the Council of Agriculture of the Province of Quebec, says the establishment of an experimental farm is much needed.

Mr. J. M. Fisk, farmer and nurseryman, of Abbottsford, P Q , says:—"Yes; it is one of the needs our country has felt the want of for some time."

Prof. Buckland, Assistant Commissioner of Agriculture for Ontario, says:—

"Experimental farms and gardens in the older Provinces of the Dominion, efficiently conducted, would materially conduce to the advancement of agriculture, horticulture, forestry and ornamental planting."

Mr. Saunders, chemist, public analyst, orchardist, &c., of London, Ont., says:—

"Such experimental farms or stations should be established in every Province of the Dominion, but the Dominion Government should have some central establishment, as at Washington, in the United States, where young trees and plants might be grown and sent by mail to be tested in all parts of the Dominion. Such an establishment should be managed by a Council or Board of Managers apart from politics, and have a revenue to support it derived from a donation of public lands for this purpose, as in most of the United States."

Nine prominent gentlemen of Hastings County, Ont., to whom the series of questions had been sent, met and after discussion agreed upon the following answer to question 7:—"Yes; there should be one such farm in each Province."

Mr. Edwin C. Beer, President New Brunswick Farmers' Association, states:—

"As the climate, soil, &c., of the different Provinces of the Dominion vary, the establishment of provincial agricultural schools and experimental farms should be encouraged by the Central Government, where such experiments could be carried on with better results. Ontario already has one, and other Provinces will follow, the Maritime Provinces probably uniting."

Mr. C. R. H. Starr, farmer and fruit grower, and Secretary of the Nova Scotia Fruit Growers' Association, replies:—"*Undoubtedly!* If one or more were established in each Province (which would be necessary to ensure satisfactory results)."

Mr. D. B. Newcomb, J.P., member of County Council of Kings County, N.S., says the establishment of an experimental farm would be "most advisable, if properly conducted, and very desirable. We are strongly in favor of stock farms and experimental farms connected with an agricultural school."

Mr. John Goff, J. P., farmer, of Georgetown, P.E.I., replies:—"Yes; it would enable the public to benefit by the result of the experiments, and where establishments of this kind are not promoted and liberally supported in a great agricultural country, it shows a lack of interest in its prosperity."

Mr. Robert D. McCallum, farmer, of St. Peter's Bay, Kings County, P.E.I., is of opinion that "one such in each of the several Provinces of the Dominion would be of advantage, if managed without allowing the blighting hand of the politician to have a finger in it."

Mr. Alex. C. Anderson, Inspector of Fisheries, Victoria, B.C., replies:—"Decidedly. Any movement in that direction would be, in my opinion, most advantageous."

Answers similar in sentiment to the foregoing might be quoted by the score, but these will suffice to indicate what is evidently the prevailing opinion in all parts of the Dominion.

### AGRICULTURAL SCIENCE.

In this connection the following by Prof. Penhallow is very suitable:—

"There is no industry, perhaps, which demands higher and broader qualifications at the present time than that of agriculture, and it is being more fully recognized than ever, that a man to be a successful agriculturist must have a broad grasp of scientific subjects. If a man is to lead in developing industry as a science and he is to take charge of the scientific work of this station, he must possess very high qualifications as a scientist and not as a practical agriculturist. A practical agriculturist, as we understand it at the present day, has no special scientific qualifications. We cannot expect to put a man of that kind into an experimental agricultural station and to bring him up to the necessary qualifications; but if we have an able scientific man, a man of proper scientific ability, he can adapt himself to the wants of the farmers, and the necessities of practical agriculture will come within his grasp. It seems to me that in the appointment of such a man it would be advisable for the Government to seek the advice of the agricultural societies; yet the Government should be careful that they do not exercise too geeat a control in sacrificing scientific attainments to what are called practical attainments. It must be remembered that all the practical part of agriculture is based upon scientific facts—*scientific knowledge*. The first requisite is to obtain exact facts; and then these may be elaborated and adapted to the wants of the practical farmer. But you cannot, in an institution of this kind, carry on practical experimentation which is not based upon scientific accuracy, because the results will be of no permanent value; whereas, if it is done upon a basis of scientific accuracy it will be of permanent as well as of immediate value. The reason why the German institutions are so successful is because they have been in charge of men of the highest scientific attainments, and their work has been strictly scientific in character. It has been adapted to the work of practical farming and the farmers appreciate it. Of course I recognize that a man who is in charge of the Bureau must be a man able to understand the wants of the farming community at large. But at the same time, he must be a man of high scientific attainments—first, because, if he is, he can the more readily grasp the wants of the farmers and appreciate them, and in the second place, because if he is a man of scientific attainments those specialists under him will have respect for what he proposes. I think there is a need here as in the United States, perhaps even more need here than there, for a higher system of education which will qualify the farmer to meet and master the problems which are inevitably bound to be presented to him in the pursuit of his avocation. I do not think that brains are to be considered at a discount in farming any more than in any other pursuit of life."

### FOREST CULTURE.

It has too long been the custom of farmers to treat forest trees as enemies, and it is only since in some sections the country has become so nearly denuded of trees that the public have shown a willingness to give the subject any consideration at all. Its importance has been too long disregarded, and the Committee feel it their duty to warn the public against its continual neglect. The vastly beneficial effects exerted by forests upon the climate, and the fact that forest culture in all countries where it is carried on is one of the most profitable of occupations, should be sufficient to direct more general attention to it. In this connection the Committee have been able to gather some valuable evidence. The following interesting passage is from a speech delivered by Hon. A. S. Paddock, in the United States Senate, on the 10th February, 1879:—

"Agriculture cannot prove enduringly successful, populations cannot be largely multiplied here, although the conditions both of soil and climate are exceptionally favorable to such results, unless the forest areas are increased proportionately, at least, with the increase of the area of agricultural cultivation. Trees are the dominating members of the vegitable kingdom. They are necessary factors in the sum total of those influences which constitute the envirronment of animal life. Trees, by absorbing carbonic acid gas and emitting oxygen, act as agents in rendering the atmosphere life-sustaining. By interposing their foilage between the sun and the earth they serve a useful purpose in sheltering the soil from the heat, and as conductors of heat, in equalizing the atmosphere of the earth and air. By covering the surface of the ground with a layer of leaves and mold they greatly assist in preventing the escape of heat from the soil, this layer of dead matter being still more useful in aborbing the fructifying rains and allowing the water to percolate steadily into the thirsty earth instead of sweeping over its surface, disintegrating and washing it away. As a mechanical shelter, trees play an important part in protecting both the ground and human habitations from cold and destructive winds. By their power of absorbtion the roots of trees take up from the soil and give off through their leaves an amount of moisture which, deducting therefrom the quantity absorbed in turn by the leaves from the air, is sufficient to exercise an important influence in increasing the general humidity of the atmosphere. As an agent in cooling the atmosphere about and above it, and thus increasing the frequency of rains and the amount of precipitation of both rain and dew, the forest subserves a most beneficent purpose. By the protection afforded the soil against the escape of moisture it preserves and tends to make regular and permanent natural springs which are necessary to the maintenance of vegetable life. In protecting the surface of the ground from rapid evaporation of the rains which fall upon it, and providing a spongy covering which rapidily absorbs and distributes these rains, it prevents the disastrous inundations of rivers which too often occur when the surface of the ground offers no obstruction to the onward flow of the rivulets that suddenly feed the main stream with their accumulated waters. The forest, too, guards the soil against abrasion and displacement from torrents and overflows, and thus again exerts its conservative influence for man's good. Moreover, we need trees for the delight they afford, as at once the most majestic, imposing and beautiful of nature's vegetable forms."

Mr. Stewart Thayne, of Ottawa, a gentleman who has made forestry a study, who has visited and is familiar with the management of most of the great European forests, and who represented the Province of Quebec at the American Forestry Congress, was called upon to give evidence, from which the Committee make a number of extracts:—

"It is impossible to study forestry without touching upon its relation to agriculture. Both are intimately connected with each other. The failure of the one, that is, the denudation of a country of its forest trees, means, if not the destruction, at least the greatest possible injury that can be inflicted upon the agriculture of a country. It is not necessary for me, in order to prove this, to go over what has occurred in ancient times, when some of the most fertile regions in the world were converted into wastes. We can see instances of this in modern times, and within the memory of living man. There is an instance in the south of France, where whole districts have been depopulated. This was owing to the fact that the shepherds on the slope of the mountains cut not only the large wood, but all the small wood, for fuel. As a consequence, the soil was thoroughly exposed to the rain, and the torrents swept the whole surface soil down into the valleys beneath. Not only was the pasture land on the slopes destroyed, but such enormous amounts of soil and such immense rocks and boulders were swept down, that devastation was carried into the fertile valleys below. It is found now that the injury done in those districts can only be repaired at an immense cost.

"In this country it is very important that the woods should be preserved. It is more important, I should imagine, than in the more moderate climates, where you do not meet with the same extremes of heat and cold. If you destroy the vegetable barrier which you have to the north and which breaks the force of the Arctic winds, you expose yourselves to severer storms of cold. Then it is known that where the forests are once removed, the evaporation of the soil is much more rapid than it otherwise would be, and you rush from one extreme of weather to the other. The influence of forests upon the climate of a country is to equalize the temperature, and the point worthy of consideration is the fact that when you destroy the forests of a country you decrease the water supply. Now, for instance, the effect of deforesting the whole of this Ottawa district would be at once to dry up all those small lakes, rivulets and streams that flow into the main river. Of course practical agriculturists can at once understand what effect that would have upon the whole region; it would be simply to render it comparatively worthless for agricultural purposes. * * * Almost all the countries in Europe have suffered more or less from the destruction of forests. Even in those countries where the remaining forests are now maintained in the best state of preservation, there are certain districts that have suffered fearfully. I may mention in this connection Switzerland, Germany, France, Italy and Spain. In Spain, it is almost impossible, at all events it would be the work of centuries, to restore such districts to their former productiveness. The slopes of the southern Sierras, the fertility of which was at one time the admiration of the world, have been entirely denuded; and those who have purchased the land, or the land-owners, will not go to the considerable expense it would involve to reafforest them. The loss sustained every year by floods alone are something enormous, and those floods may be traced to the destruction of the woods on the head-waters of the rivers."

Speaking of the necessity for the rigor of the German forest laws, which go to the extreme of forbidding an owner from cutting his own trees, except with the consent of the Government officer and the neighboring land owners, Mr. Thayne said:—"One reason for this, is the fact that the great rivers of Europe have diminished very considerably. I have not the statistics with me, but rivers which were once navigable for vessels drawing three or four feet of water are now not fit to float a respectable barge. This has caused very serious alarm."

In the following extract Mr. Thayne indicates a line of action that he thinks might advantageously be undertaken by the Government: "The principal point upon which they might take action would be this—they should separate the lands which are known to be unprofitable for agriculture, and devote them exclusively to forestry purposes, or to the production of timber. We have lands of that charactor here. Up the Ottawa, for instance, settlers have been induced to go in and settle on the pine lands. There, after one or two crops, it will take more than the original value of the lands to make them produce again. After three or four crops, at the outside, the thin covering of the soil over the sand becomes utterly exhausted. These pine lands, and all the lands only fitted for the cultivation of pine and spruce, should be set apart for the cultivation of those trees. There are millions and millions of acres in Ontario and Quebec which could be made productive timber districts, but which will never be productive agricultural districts."

### BEET ROOT SUGAR INDUSTRY.

An emphatic opinion was expressed by some of the witnesses that the beet root sugar industry was capable of successful prosecution in this country. Notwithstanding the want of success that has attended its introduction into Canada, the reasons urged in its favor seem of sufficient force to warrant a place in this report.

Mr. Gibb, of Abbottsford, stated :—" When we were going through Central Russia, that is, the prairie district of Russia, here and there we would come across a few thousand acres of beets, and in the centre a large factory, with a big chimney, evidently a sugar factory. I understand that all the sugar in Russia, except a little cane sugar in St. Petersburg, is made there. That portion of Russia has about the same climatic conditions as Canada."

Mr. J. X Perrault, of Montreal, Commissioner for Canada at the Centennial and Paris Exhibitions, in his evidence stated :—" My opinion is that the beet root sugar industry can be made a success in Canada just as it has been in Russia, Germany and elsewhere, where thousands of millions have been produced. I know it has not been a success in Quebec, and why? We called upon farmers who had not grown it before to take an acre apiece. They used the land as it was; it had no previous preparation—no manure or anything—it was common land that was taken in many cases. The farmer went to work first to secure his ordinary crops, and when he had done that he said : 'Now, I am going to plant some beets.' Not having the implements, not having the experience, not giving them sufficient care, the crop did not yield as they would yield if the beet crop was the main crop. It must be the main crop where there is a sugar factory. I am persuaded that with private capital and private farming the cultivation of beet root sugar in Quebec would revolutionize the Province and make us what France has been made, for it is the beet that has saved France.

"If a factory is to succeed in Lower Canada, or anywhere else, the beet root must be the main crop of the party that starts the enterprise; he must have the nucleus of the crop in his own hands in order that there may be a certain number of tons sure for the factory to run upon, and then other parties may be invited to join and help. The moment we have the beet root, then we have the manure; and it is only through the manure that we can quickly improve the agricultural resources of Canada. The question in Lower Canada is the production of manure; it is a costly thing now, while if we grow beets and sell them, and get the refuse, it is equal to selling the beets and keeping them, that is, if the beets are properly treated.

"If we could get that industry started in Lower Canada, where sugar is so much consumed, there is no doubt that the land would double in value as it has done in France. It is only since the introduction of the beet sugar industry into France that the land there has doubled in value, so I think it is an industry which should be fostered by the Government. It is well known that Napoleon offered a reward of a million dollars to the party who should succeed in making sugar out of beets, and that is how the industry was begun. The science is now known everywhere; but still if there was some encouragement given to the person who would start such an industry, the thing would benefit the whole country, and it is admitted that what benefits the whole country should be paid for by the Government of the whole country.

"In the north of Russia the industry is carried on most successfully. In a report on the subject, published in Washington, of which I just spoke, you will find marked the precise location of every factory in Russia, and you will see that there are fifty or sixty factories in the north. It is known that the beet root sugar industry of Russia is the richest in Europe; in fact, the further north the beet root is grown the larger its percentage of sugar."

## STOCK-RAISING.

Upon this branch of the enquiry the Committee have been unable, through various causes, to bestow a close examination. It is gratifying, however, to notice the increased attention that has been paid to stock-raising in Canada of recent years, the great dimensions the Canadian cattle trade has assumed, and the growing popularity of Canadian meats in the British market. We give place to the following extract from a letter by Prof. Brown, of the Guelph Agricultural College:—

"The stock-raising and feeding disadvantages are—want of better pasture—such permanent pasture as the Ontario Experimental Farm has shown can be so easily established and maintained, able to keep one and one-fourth cattle beast per acre in place of three acres of the present stamp being required for one animal; want of better tree shelter; want of more pure-bred males; want of knowledge of adaptability of breeds to particular conditions throughout the Dominion. I am so satisfied of the adaptability of parts of our Dominion to the production of mutton and wool on the large and cheap scale, in the North-West Territories and Eastern Provinces, that in December last I made a specialty of the subject in an address at St. Sohn, N.B.

"No part of the American continent can compete with us in the healthy maintenance of cattle and sheep, and were our farmers alive at the present moment to what is going on in the United States as preparatory to an almost universal bonanza in beef and mutton, they would surely waken up. I see no reason why Canada should not place and hold herself as the sole breeding ground for the United States. The Americans themselves think so; they act upon this belief, and yet we do not seem to see it.".

### THE DAIRYING INDUSTRY.

The Committee have received some important testimony on the butter and cheese industries. For a convincing illustration of the importance of these industries the Committee feel they cannot do better than quote the entire views of Prof. S. M. Barré, of Quebec, who has visited Denmark and other countries in Europe, to gather information on the processes followed in those countries. Prof. Barré has charge of the Provincial Creamery in his Province, and is a recognized authority on these subjects. He writes:—

(*Translation.*)

### PRESENT IMPORTANCE OF THE DAIRY INTEREST IN CANADA.

The dairy industry is now the most productive agricultural industry in the country. It has assumed such proportions within the past few years that the export alone gives to Canada an annual revenue of some $8,000,000. England buys yearly 200,000,000 pounds of butter. During the year ending 30th June, 1883, Canada exported to England 57,672,959 pounds of cheese, and 6,230,173 pounds of butter. This shows that the yield of our dairy products is susceptible of considerable increase.

### OF THE BENEFICIAL EFFECTS THE DAIRY INDUSTRY IS DESTINED TO PRODUCE ON AGRICULTURE.

Dairy farming has the effect of increasing the number of stock and, as a consequence, the quantity of manure at the disposal of the farmer. It therefore enables him to manure his land more thoroughly. Moreover, in order to secure an abundance of milk the farmer must have good milch cows, well fed. In order to accomplish this he must improve his stock and his method of cultivation, if they be defective. After a few years the farmer, who was heretofore behind hand, finds himself possessed of an improved farm, a fine herd of cattle and a considerable income, and all this has come about in such a manner that he scarcely perceives the changes which have taken place in his farm and, in fact, in his own habits. Dairy farming thus induces a happy concatenation of causes and effects which come very near solving the great question of the regeneration of agriculture where it is needed.

### FAULTS IN OUR CHEESE PRODUCTION.

The chief fault to be found in cheese production in the Province of Quebec is in the packing. (Cause.)—The boxes used are unfit for the purpose. The curing of our cheese is defective at the opening and the end of the dairy season. It is the same during the great heat of summer. (Causes): The cheese factories are too slightly built and not fit to protect the product against atmospheric influences.

### REMEDIES.

In order to improve the average quality of our cheese, all that is needed is to impart the knowledge which has been attained in Ontario to a certain number of intelligent cheese makers, and then employ them as instructors or as inspectors of cheese factories where the manufacture is defective.

The diffusion, by means of the press, of the knowledge requisite for the proper manufacture of cheese and the establishment of good factories. It would also be necessary to recommend the manufacture and use of good boxes for packing.

### DEFECTS IN OUR BUTTER

1st. Defects in the making by the greater number of our farmers, particularly those who keep only a small number of cows.

*Causes.*—Want of knowledge and of the time required for the making of this product. The ordinary occupations of a farmer's wife are too numerous and too complex to permit her to devote to butter making, the time, care and attention required. Labour is now too dear to be profitably employed in this way. For these reasons, the making of good butter for export is now nearly impossible on seven-eighths of the farms of Canada.

*Remedies.*—1st. Diffuse general information on butter making by means of pamphlets, &c. 2nd. Establish public dairies or butter factories.

### WANT OF UNIFORMITY IN MAKING.

*Causes.*—Want of uniformity in the methods adopted and in the principles generally accepted. The butter is made by too many persons devoid of experience, who have neither the skill nor the taste requisite for this kind of work.

### REMEDIES.

The adoption of methods specially adapted to the wants of the country and the inculcation of a single theory, scientifically examined and practically tested by competent and disinterested men, in an experimental station. 2. The establishment of public dairies or butter factories.

### CONCLUSION.

From what precedes, it is easy to see that in order to improve the average quality of our butter, to insure uniformity in production and facilitate immediate shipment to foreign markets, butter factories must be established.

The establishment of butter factories is then the most powerful lever we can make use of to improve and develop the butter industry in Canada.

Hence, it is of the utmost importance to diffuse the information requisite for the establishment of those factories.

In order to establish butter factories, you need skilful and experienced dairy managers, and in order to have the latter, you must form them. They can be trained by establishing dairy schools at various points throughout the country.

In teaching butter making in the dairy schools, you must have a definite theory and methods scientifically studied and practically tested. This can be done only in an experimental dairy station. The establishment of an experimental dairy station, similar in kind to those which exist in large numbers in Europe, is the starting point. The theory studied in the experimental dairy station must be taught in the dairy schools and practised in the factories generally, and the factories will diffuse practical knowledge as to butter making amongst the farmers.

In the last paragraph we have a summary of the organization of a system of theoretical and practical instruction in dairy work similar to that which exists in Denmark. And, as regards butter making, Denmark is certainly in advance of every other country in the world. We must not lose heart and think that the application of this system will require a long period of time before giving results, for it is not necessary to go over all the ground travelled by the Danes; we need only profit by their experience and apply the knowledge they possess to the special circumstances of this country.

Prof. L. B. Arnold, of Rochester, N.Y., a leading authority in the United States, was examined by the Committee, and a few extracts are made from his evidence:—

"If we take cheese, the obstacles in the way of success are, first, a want of skill on the part of manufacturers, and in the second place a deficiency in the quality of rennets. * * In the preparation of rennets, manufacturers are apt to get it tainted. It will get actually into a state of putrefaction, in which condition it will injure the quality of the cheese vesy materially."

On account of the inferior quality of the butter made, Prof. Arnold estimates the annual loss suffered by Canada at $5,000,000.

Being asked what steps should be taken to disseminate useful information about butter and cheese making, Prof. Arnold said:—"Perhaps as good a way as any is to give personal instructions. There are a good many ways in which the Government might facilitate the spread of the knowledge of the art. Now, in Denmark, the Government supports a professor at the Royal Agricultural College, Copenhagen, and besides his duties as lecturer at the College, he spends a portion of his time every year going about the country, farm to farm. He does it in this way. He sends to some leading farmer and advises him that he will be at his house at a certain time, that he will stay there two weeks and make butter and cheese there, and that all the neighboring dairymen, dairy maids or dairy lads, as the case may be, who want to learn to make butter and cheese, can come there and question him, and see him work practically. In Ontario the Government furnishes money to the dairymen's associations to be expended by them in employing instructors and in other ways to distribute knowledge. Last year there were four instructors employed in giving instructions to cheese makers all summer. Three of them were paid by the Government and one by the convention. In that way they have put ahead the cheese industry very rapidly. * * In Denmark a good deal of attention has been paid to new apparatus for handling milk, cream and butter. The more you can do with machinery the better. Let the thing be done by apparatus rather than by attempting to educate the makers into the intricacies of the art. * * It is more profitable to make creamery butter than dairy butter as a rule."

Mr. W. H. Lynch, of Danville, P.Q., author of a valuable book on "Scientific Butter Making," a large edition of which has been published by the Ontario Government for gratuitous distribution, was also examined. Speaking of the good results of Government assistance to the dairy industry, he said:—"Wherever there has been anything done by the help of the Government, which could not have been done by individuals, the results have been more than commensurate with the cost. In our Province of Quebec, one of the best things the Government has done for sometime, has been, in my opinion, the encouragement of this industry, and the results are observable all over the Province."

Mr. Lynch observed that a great difficulty in the way of provincial aid was lack of means at the disposal of Provincial Governments. "This simply points," he urged, "to the necessity for Dominion action, because where the need may be recognized provincially, it may, for one reason or another, not be carried out. That leads me to this point—that the Dominion can do once for all what each Province would have to do separately, and what each might neglect to do owing to its condition. I cannot speak in too emphatic terms of the importance of the Government doing whatever it can to further agricultural industries—all branches of them; and I think that the general opinion of the farmers will be that the results will be manifold, and the expenditure one of the best that can be made."

Mr. Lynch urged that "precedents for Governmental action were certainly not wanting. Denmark, which now has the acknowledged highest place as a producing country in this line, and has, in consequence, a large export trade, has attained this position by Government action. For fifty years Denmark has been, through the Government, giving great attention to this important industry. The results are that they now ship butter to warmer climates where other countries find no foothold." He advocated the establishment of a model dairy, which could be visited by those wishing instruction; grants to dairymen's associations; to be visited at their annual meetings, whenever practicable, by properly qualified lecturers or professors to discuss improved methods, &c.; also the publication of short reports of the proceedings of these associations or conventions, and of other information deserving of publication. He estimated the annual loss, through lack of improved methods and knowledge in butter making, to be not less than $5,000,000, the greater part of which he believed could be saved by well-directed Government action.

In a communication to the Committee, Messrs. A. A. Ayer & Co., exporters of butter and cheese, with establishments at both Montreal and New York, state:—"There is a general deficiency in the manufacture of cheese in the Province of Quebec, and in some parts of Ontario, but this is traceable to the rapidity of the growth of the manufacture and, no doubt, as the makers get more experienced they will make better quality, and as the farmers grow wealthy they will be willing to put up better buildings and pay better prices for everything that is used about the factory. The matter requiring immediate and urgent attention is that of better boxes. We do not think the Government is aware of the importance of the manufacture of cheese. We were pleased to note the remarks of Mr. Arnold before your honorable Committee the other day, but Mr. Arnold has by no means stated the whole facts of the case. The total exports of cheese for the last six years from Canada have gone on increasing with wonderful rapidity, until during 1883 over 1,000,000 boxes of cheese, amounting to about $7,500,000, besides nearly $2,000,000 worth of butter, has been sent out of the country. The peculiar situation of Canada, in this cool climate, puts us in the same position as Denmark and Sweden, and leaves it without question that there is no place in the world that can rival us in the production of both butter and cheese. If the Government desires to foster the larger make and better quality of cheese, we would respectfully suggest that it can best be done by employing skilled, practical makers of cheese to go about the country among the factories giving them instructions. This has been done to some extent in Ontario with commendable results, but we think a considerable improvement can be made on the system there and, with no disrespect to Prof. Arnold and men in similar positions, our experience of some twenty years (and permit us to add, that during that time we have been by far the largest exporters of butter and cheese from Canada and, perhaps, from this continent) has led us to believe in the instructions of good, practical makers, who have a well-known reputation and are always successful in making the finest cheese."

### INSECT RAVAGES.

The evidence went to show that insufficient efforts are made to prevent ravages by insects, from which enormous loss results yearly. Some witnesses stated that a loss of one-tenth of our agricultural products is caused by insects. The difficulties they impose upon farmers were well expressed by Mr. L. VanCamp, of Bowmanville, Ont., a farmer, one of the delegates from the Dominion Grange, who appeared before the Committee:—

"As for the insect scourge in agriculture, it places the agriculturist in a continual warfare, from the time the frost leaves the soil in the spring until it binds it up again in the fall. During all that time the agriculturist has no leisure. If he wishes to be prosperous he must only take sufficient time to eat his meals and sleep. At other times he must be carrying on a continual warfare with these insects. There is something to attack everything that the farm produces, and if we do not give attention to it, that crop is sure to be a failure."

Mr. James Fletcher, Vice-President of the Entomological Society of Ontario, says:—"Taking the average annual farm produce of Canada at only $200,000,000, which is the lowest possible estimate, I think the lowest figure at which we can put the injury done by insects is one-tenth of the whole, or $20,000,000."

Mr. Fletcher thinks if more knowledge of entomology were disseminated, the ravages would be lessened. The entomologists in the United States seem to have rendered great service to the agricultural class, and the high value the people of the United States set on their investigations is evidenced by the large sums of money annually voted for their support. He was of opinion, that if a bureau of entomology were organized, the benefits to be derived from it would much more than repay the necessary outlay. As a proof, he drew attention to the fact that all the important insecticides had been discovered by entomologists, and not by accident, but after a great many experiments. Mr. Fletcher laid great stress upon the fact that our most injurious insects were small or inconspicious, and were injurious owing to the fact that the farmers did not recognize them as enemies, so did nothing to prevent their ravages. In many instances, although they suffered from them, they did not know whence the injury originated. Under this head he drew attention to the wheat midge, Hessian fly and particularly the clover seed midge. He was of opinion that all these could be kept away, if there were a state officer to refer to, and whose duty it should be to visit infested localities, and suggest proper remedies. Occasionally the wrong remedies were applied to certain pests, when naturally, failure was the result. To this he attributed much of the want of sympathy among farmers with the work of the entomologist, maintaining that the man who made a special study of injurious insects was certainly better able to combat them than those who know nothing or very little about them. Farmers would, without taking advice, apply the same remedy for all insects, not considering what its habits were. Every insect had its characteristics. Some attacked the root, some the leaf, and others the fruit, and it was estimated that every plant in America had an average of six insect foes which fed on it. It had been found by Dr. Lintner, the New York State Entomologist, that the apple tree had no less than 176 enemies.

Mr. W. H. Harrington, of Ottawa, member of the Entomological Society of Ontario, said: "The farmers could do something to increase the number of beneficial insects, if they knew them; they could refrain, for instance, from killing those that are beneficial * * * * I think it was in 1856 or 1857 that the midge was first introduced into Canada. It was introduced into the United States, from Europe, about the beginning of the present century, and it was very destructive in some parts of the States in 1854. In 1856 and 1857 it did great damage in Ontario. The damage to the wheat, in one of those years, was estimated at $8,000,000. But by the introduction of midge-proof wheat, the damage was lessened and by late years the midge has not been abundant. Mr. Arnold, of Paris, made experiments with midge-proof wheat, by hybridizing wheats. There were certain varieties found which were not touched by the midge, but they produced an inferior grain with a hard cover. By hybridizing them with a wheat producing a good grain, they got midg peroof wheat, which owing to the hardness of the cover, resisted the attacks of the larvæ. In the same way, to a certain extent, the Hessian fly has been dealt with, by getting a grain with a heavier stalk. The Hessian fly feeds in the joints of the stalk above the root; if the stalk is too hard for it, it cannot injure the plant very much. But as regards the Hessian fly, sowing the wheat very late in the fall is perhaps the principal method of dealing with it, as it attacks the fall wheat principally. The eggs are laid just above the root, in the fall, and the larvæ feed on the root and in the stem. By sowing the wheat as late as possible in the fall, it would not grow sufficiently for the fly to do much damage to it."

### UNITED STATES AGRICULTURAL DEPARTMENT.

The Committee have pleasure in acknowledging the courtesy of the Hon. Geo. B. Loring, United States Commissioner of Agriculture, in furnishing the Committee with reports and pamphlets from his department. We give his letter:—

"UNITED STATES DEPARTMENT OF AGRICULTURE,
"WASHINGTON D.C., 11th February, 1884.

"SIR,—I have the honor to acknowledge the receipt of your letter of the 2nd inst., desiring a copy of the laws relating to agriculture, and the Act under which this Department is organized, the regulations under which it is governed, &c., together with other information indicating in what respect this Department seems most fruitful of good results.

"I take pleasure in mailing to your address (1) 'Swank's History of the Department,' in which, pages 31 to 33, you will find a copy of the Organic Act, and its phraseology expresses clearly the intent of its framers as to the method deemed best to promote the agricultural interests; while the accompanying statements of the work done up to the date of its issue (1872), will give you the methods adopted for the work and the accruing benefits to that time.

"I mail also (2) a copy of the last annual report of this Department, from which you will learn the progress that has since been made in the work assigned to it, and the additional methods suggested by experience for extending its usefulness.

"And (3) copy of Special Report No 1, being an address before the American Forestry Congress, which will show you what has been done in that direction, and what it is desirable should still be done; (4) Special Report, No. 2, being the proceedings of a convention of agriculturalists held at this Department, from which you can probably glean items of interest to the work on which you are engaged.

"Within the past few years special legislation has been had in reference to the sugar industry, and the present Congress is now engaged upon a Bill for stamping out cattle diseases. Other than these, no recent special legislation on the points of your enquiry, has been approved.

"The work of the Department 'seems most fruitful of good results'—(1) in the dissemination of rare and valuable plants and seeds, which are procured both by purchase and exchange with foreign countries; (2) by communicating to different districts the information obtained from other localities as to soils, methods of cultivation, climatic influences, &c.; and (3) by publishing the results attained in the principal sub-divisions, through their researches and experiments.

"I should be pleased to receive from you a copy of any Bill your Committee may prepare on this subject when it is perfected.

"I have the honor to be, very respectfully, Your obedient servant,

"GEORGE B. LOVING, *Commissioner*."

"G. A. GIGAULT, Esq., M.P.,
"Chairman of Committee, Ottawa, Canada."

"Swank's History of the Department" describes in a very interesting manner the growth of the Department from 1836, when the Hon. Henry L. Ellsworth, Commissioner of Patents, inaugurated a system of distribution of seeds and plants obtained through United States Consuls in foreign countries, and in which year a botanical garden was established in Washington. The work continued to grow and measures for the encouragement of agriculture multiplied annually, under the auspices chiefly of the Patent Department, but it was not until 1860 that the Department of Agriculture was formally and permanently organized. Although much had been done, the author considered it fell far short of what should have been done in that direction by the United States Government and, writing in 1872, he used the following language:

"Our commerce and manufactures are of vast importance, but they are of secondary interest when compared with our stake in agriculture. * * * We are distinctively and pre-eminently a nation of farmers, and such we shall undoubtedly remain. The temperate and stimulating climate in our country, the variety of soil and range of latitude and elevation, the rural tastes of our people, and the vast domain yet open to homestead occupancy, combine to assure a continuance of the interest hitherto manifested in agricultural pursuits. It is somewhat strange, therefore, in view of all these facts, that so much attention has been bestowed, from the foundation of the Government upon the encouragement and improvement of agriculture; stranger still, that any professedly patriotic citizen should ever have given utterance to the sentiment that 'agriculture can take care of itself.'"

Mr. Swank thus speaks of the effect of the statistical work of the Department:—"The annual report of 1863 contained the first attempt that had been made since the days of Ellsworth and Burke to ingraft upon the Census returns the statistics of the yearly progress of the agricultural production. * * * * From that day until this the Department has aided greatly, by the publication of tables of this character, in protecting alike consumers and producers from the exactions of grasping speculators. A Maine farmer once wrote to the Department: 'Your monthly reports give me just the information I have wanted for years. Knowing the supply and demand, I am able to sell at my own price, and we can also forsee what will probably be wanted next year. Give practical farmers facts and let gentlemen of leisure theorize.'"

The following section of the Act of Congress, establishing the Department, defines the duties of the head of the Department:—

"Sec. 3. *And be it farther enacted*, That it shall be the duty of the Commissioner of Agriculture to acquire and preserve in his Department all information concerning agriculture which he can obtain by means of books and correspondence, and by practical and scientific experiments (accurate records of which experiments shall be kept in his office), by the collection of statistics, and by any other appropriate means within his power; to collect, as he may be able, new and valuable seeds and plants; to test, by cultivation, the value of such of them as may require such tests; to propagate such as may be worthy of propagation, and to distribute them among agriculturists. He shall annually make a general report in writing of his acts to the President and to Congress, in which he may recommend the publication of papers forming parts of or accompanying his report, which report shall also contain an account of all moneys received and expended by him. He shall also make special reports on particular subjects whenever required to do so by the President or either House of Congress, or when he shall think the subject in his charge requires it. He shall receive and have charge of all the property of the agricultural division of the Patent Office in the Department of the Interior, including the fixtures and property of the propagating garden. He shall direct and superintend the expenditure of all money appropriated by Congress to the Department and render accounts thereof, and also of all money heretofore appropriated for agriculture and remaining unexpended. And said Commissioner may send and receive through the mails, free of charge, all communications and other matter pertaining to the business of his Department, not exceeding in weight thirty-two ounces."

Congress has been liberal in its grants to the Department of Agriculture.

We notice that in the year ending 30th June, 1882, considerably over $350,000 was expended by that Department. The following are some of the heads of expenditure:—Purchase and distribution of valuable seeds, $79,991; experiments in tea culture, $8,743; experimental garden, $6,968; investigating history of insects, $19,998; investigating diseases of swine, $22,443; reclamation of arid and waste lands, $10,000; report on forestry, $4,941; experiments in manufacture of sugar, $32,333.

The fact that the work of the Department is constantly extending and that the expenditure is growing annually, may be taken as evidence that the people of the United States believe the Department of Agriculture pays.

As a fruit of the policy followed by the Department, many articles are now successfully and profitable grown that were introduced and first experimented on by the Department. The production of other articles has also been largely increased through the effect of discoveries, improved methods and suggestions made by its officers. Within the last few years experiments have been made at considerable expense, with the sorghum sugar cane, the tea plant, and for the encouragement of grape culture and winemaking. Should these experiments prove successful and lead to extensive and lucrative prosecution of the industries connected with the growth of these articles, the cost will be insignificant beside the results. By experiments such as these the United States Department of Agriculture has already conferred great benefits upon the people.

Mr. Perrault, one of the witnesses examined by the Committee, pointed out that a Canadian Bureau of Agriculture would be able to avail itself of much valuable matter from the annual reports and experiments of the United States Bureau.

### PRESENT CANADIAN LEGISLATIVE ACTION.

For the purpose of obtaining authoritative information concerning the nature and extent of the steps taken by the Dominion Government for the encouragement of agriculture, Mr. John Lowe, Secretary of the Department of Agriculture, was called and examined. The following is part of his evidence bearing on this point :—

"Q. Does the law as it at present stands authorize the establishment of an Agricultural Bureau, and the appointment of a Commissioner of Agriculture?

"A. The Act of 1868, constituting the Department of Agriculture, would amply provide for the whole of that. The Act provides that the Minister of Agriculture, for the time being, shall be charged with the execution of laws and Orders in Council, and the direction of all public bodies, officers and servants employed in carrying out such laws. The comprehensiveness of that section, therefore, covers every single point of that question. The first function in the enumeration of its duties is agriculture. There has, however, been no special vote for the general purposes of agriculture. There has been special votes for particular branches: for instance, cattle quarantine and inspection, the gathering of stat istics in certain particular cases, and also grants to exhibitions. Hitherto those have comprised the whole functions of the Department in relation to agriculture."

Mr. Lowe proceeded to describe the beneficial results of Government action in preventing the spread of and repressing contagious cattle diseases. He stated :—"The measures which have been taken, and the extreme vigilance with which those measures have been carried out, have preserved this country from all attacks of contagious diseases from the outside, and have done for us what certainly has not been done for the United States, that is to say, they have given us immunity from being placed on the scheduled list in the United Kingdom, the result of which is that our cattle are now freely exported to the United Kingdom. We can send stock cattle over; they are bought at fair prices and fed in the United Kingdom; the value of that is estimated by exporters at the moderate extent of two cents a pound on the whole gross weight, which is certainly an enormous advantage to the farmers of this country, and under the fostering effects of which the cattle trade has increased within three or four years from almost nothing to its present very large proportions."

It is thus seen that the Department of Agriculture, as at present constituted, devotes but a small portion of its efforts to purely agricultural objects. The force of the Department appears to be employed chiefly in connection with the Patent Office, the Census and Immigration, to which work for purely agricultural ends seems to be subordinated. According to Mr. Lowe's evidence, however, the efforts spent in that direction in combatting contagious cattle diseases have produced most gratifying results.

The Committee communicated with the Governments of all the Provinces, asking to be informed of the measures employed by them to encourage agricultural industries. The replies from all, except the Nova Scotia and Quebec Governments (which have omitted to reply up to the present date), will be found in the appendix. It will be seen by referring to them that in the majority of the Provinces not much is done by the respective Governments to further agricultural development. Ontario and Quebec have been more liberally disposed, and the expenditures made in those Provinces have produced excellent results.

### CENTRAL BUREAU.

The evidence received by the Committee tends strongly in favour of the establishment of a Central Bureau of Agriculture, the duty of which it would be to ascertain prevailing methods in other countries—the most successful methods—how they can be adapted to the wants and requirements of this country, to introduce new seeds, plants, trees, &c., found after experiment to be suited for growth in Canada, &c. Strong approval is expressed of the periodical issue of bulletins and of the dissemination of handbooks and reports containing useful information collected by the Bureau on culture, stock-raising, dairying, poultry-keeping, &c. Prof. Brown, of Guelph, in the following, expresses the general sentiment:—

"I am of opinion that were the Government to issue annually a succinct, well-arranged and readable report, on the whole industries of the Dominion, the effect would be felt. It would have to be crisp, semi-entertaining, partly historical, up to time and smart in its issue. Allow me to ask one question: if your Government is now preparing such a digest, in view of the visit of the British Association for the Advancement of Science? If not, we will surely be found wanting. * * I can conceive of no better way of expending $10,000 annually than by the employment of one expert who, quarterly at least, would submit such choice agricultural literature in pamphlet form, not too massive, as would command the confidence of our farmers."

### CONCLUSION.

Considering that the proper development of our agricultural resources is indispensable to the upbuilding and maintenance of our national wealth and prosperity, and that all progressive countries are at present making strenuous efforts for the introduction of improved methods of agriculture, your Committee believe that no object is more deserving of the active and generous support of the Federal Government than that of fostering and promoting this great industry, and of prompting, guiding and co-operating with all local and provincial institutions formed for the furtherance of this object. Your Committee, therefore, beg leave to summit the following recommendations:—

That the Government take into earnest and favorable consideration the advisability of establishing a Bureau of Agriculture, and an Experimental Farm in connection therewith.

That this Bureau be formed in connection with and under the supervision of the present Department of Agriculture.

That the objects aimed at in the establishment of such Bureau and Farm be as follows:—

1. To conduct such experiments in the introduction and culture of new varieties of seeds, plants, trees, &c., as will most efficiently aid in the advancement of Canadian agriculture; to institute experiments with regard to the comparative value of fertilizers, the proper testing of seeds as to vitality and purity, and the healthy preservation and productive conditions of plants and animals.
2. To make careful investigation into the origin, distribution and habits of insects injurious and beneficial, and the contagious and other diseases to which animals and plants are subject, in order to arrive at the best method of destroying and counteracting them.
3. To study the qualities of the various breeds of cattle and other domestic animals, with the view of reporting on the best means of improving them; of protecting them from parasites and epidemic diseases, of feeding them for the market, and on the treatment of milch cattle.
4. To initiate and carry out a convenient and comprehensive system of gathering the latest and most useful information, statistical and otherwise.
5. To publish and send to the press and the various agricultural and horticultural societies of the Dominion, at different period of the year, bulletins giving the results of trials made on the Experimental Farm, and whatever other information the Bureau may consider useful, either in the prevention of the ravages of insects and

of contagious diseases among animals, concerning improved methods of culture that have stood test, or for the special advancement of any line of agricultural pursuits.

All of which is respectfully submitted, with the evidence herewith appended.

G. A. GIGAULT, *Chairman.*

Committee Room, Monday, 21st March, 1884.

# APPENDIX

TORONTO, 8th February, 1884.

SIR,—I have the honor to acknowledge the receipt of your letter of the 4th inst., relative to legislative encouragement given in Ontario towards developing its agricultural resources.

You will find in the "Manual of the Agriculture and Arts Act"—a copy of which I mail to your address—the present state of the law relative to the various societies connected with my Department.

Mechanics' institutes, library associations and the society of artists are under the supervision of the Minister of Education.

I have much pleasure in stating that the agricultural societies, on the whole, continue to do good work. Among so large a number, there are some, of course, that make but slow progress; but few, if any, are retrograding. The old Provincial Association has of late had new life infused into it, and appears to be surely regaining its former usefulness. The Agricultural College and Experimental Farm indicates a steady and healthy growth, and is doing an increasing amount of good to the Province and the Dominion. The Fruit Growers' Association, now including the important subject of forestry, and the Entomological Society continue to increase in popularity and usefulness. The additional efforts made of late in calling public attention to the necessity and advantages of forest culture and preservation are, at least, encouraging. The recently organized Bureau of Industries continues to increase in public favor and practical utility, and I look forward with confidence to the valuable services which it will render to agriculture and commerce. The two Dairymen's Associations have also largely contributed to the development of that important source of agricultural wealth.

I will send you copies of a few of the more recent reports of societies connected with my Department. Those for the year 1883 are in course of being printed.

I shall always be happy to coöperate with the other Provinces and the Dominion Government, as opportunity may arise, towards the procuring for publishing purposes such facts and information of a reliable character as will fairly represent the state and progress of our national agriculture and its cognate industries.

I have the honor to be, Sir, your obedient servant,

A. M. ROSS, *Commissioner of Agriculture.*

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CHARLOTTETOWN, P.E.I., 20th February, 1884.

SIR,—In answer to your communication of the 4th inst., I have the honor to state that there are no Acts passed by the Legislature of this Province respecting agriculture or for its encouragement, except the following, viz.:—

An Act to regulate the management of the Government Stock Farm, 44 Vic., cap. 9. The Domestic Animals Act, 1878, with its amendments. An Act respecting Dogs (1881). An Act to prevent the spread of the Potato Bug (1883). Copies of all the above I have mailed to your address. There is no Bureau of Agriculture in or for the Province.

Your obedient servant,

ARTHUR NEWBERY, *Assistant Provincial Secretary.*

VICTORIA, B. C., 21st February, 18‹4.

SIR,—I am in receipt of your letter of the 4th inst., and hasten to say, in reply, that the Department of Agriculture in this Province is still in the chrysalis stage, so to speak, and it would be presumption for me to attempt to enlighten old Canada upon matters in respect of which we ourselves are still so far behind.

By reference to reports of immigration agents (copies of which I am mailing), you will observe that the subject of agriculture is only incidentally touched.

It is, perhaps, due to myself to mention that I hold the office of Minister of Agriculture in conjunction with several others, the duties of which, at present, absorb my attention.

I am, Sir, your obedient servant,
JOHN ROBSON,
*Provincial Secretary, Minister of Mines, Finance and Agriculture.*

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DEPARTMENT OF AGRICULTURE, STATISTICS AND HEALTH,
WINNIPEG, MANITOBA, 20th Feb., 1884.

SIR,—I have the honor to acknowledge receipt of your letter of the 4th inst., asking as to the operations of this Department.

I have already sent you two copies of the Agriculture, Statistics and Health Act, 1883, under which the Department is administered; also copies of instructions to Registrars of vital statistics, a copy of the annual report of the Department for 1882, and copies of all the crop bulletins issued in 1883, still in print. The Dominion Department of Agriculture at Ottawa, has been supplied under an arrangement with this Department, with full statistical information as to the agricultural progress of the Province during 1883; and I would suggest that you communicate with the Secretary of that Department, Mr. Lowe, in reference to this branch of the subject.

The work of this Department is divided into several branches, the principal being as follows:—

1. The operations of the Board and Council of Agriculture. The Board is composed of thirty members, one representing each electoral division in the Province. The Council of the Board is composed of eight members selected so as to give territorial representation to each portion of the Province. The work of the Board embraces the supervision of the various electoral division agricultural societies, of which there are now twenty-six in operation, the management of the Provincial Exhibition, the representation of the products of the Province, at exhibitions in either of the Provinces, or any other countries; and generally the advising of the Department on matters relating to the agricultural interests of the Province.

2. Veterinary Sanitary Service. In this branch are included the establishment and management of a Veterinary School of Instruction, the supervision of the practice of veterinary surgery, and the licensing of practitioners, and the enforcement of the laws relating to diseases of animals. In this branch there is a consulting veterinarian, who is assisted in the discharge of his duties by seventeen district veterinarians acting in different counties in the Province. Attention is directed in this connection to the fact that the Veterinary Sanitary Service of this Department is the only one in existence in the Dominion, and probably the only one systematically organized on this continent.

3. Publication of bulletins relating to the condition of crops, and live stock, in collecting information, for which one voluntary correspondent acts in each settled township in the Province. These bulletins are published montly during the growing season.

4. Experiments in forestry and horticulture, and the observance of an annual arbor day for the carrying out of which object a Bill has been prepared by the Department to be introduced at the approaching Session of the Legislative Assembly.

5. Enforcement of the law for the destruction of noxious weeds. This duty, as in other parts of the Dominion, has heretofore remained entirely with the municipal authorities, but experience having proven that in their hands the law has

been a dead letter, the Department has been given power to appoint inspectors in various parts of the Province, who shall see that the pathmasters appointed by the municipalities do their duty.

6. Meteorology, especially the rainfall and snowfall, observations of which are taken at about fifty stations scattered through every portion of the Province. Co-operation in this work has been effected with the Dominion meteorological service which is supplied with the local reports of this Department, that service in return giving this Department the use of the returns from its temperature and other stations in Manitoba and the North-West.

7. Vital statistics, in recording which the clerk of each municipality acts as an agent of the Department.

8. The collection of general statistics relating to all branches of statistical enquiry and record.

9. The carrying out of the law in reference to the protection of game, fur-bearing animals, and insectivorous birds.

10. The operations of a public health branch in charge of a provincial health superintendent, with a medical health officer in each county.

11. The inspection and supervision of public hospitals receiving Government aid.

The publications of the Department at present consist of—First, reports embracing the whole work of the Department and its various branches, which are published annually; second, bulletins published monthly during the growing season of the crops.

In conclusion, I may say that the Department has only been in operation since June, 1882, and that much of the time during which it has been in existence, has therefore been necessarily occupied in the work of organization. A large amount of important work has been accomplished, and there is evidence on every hand of warm public approval with its objects and successes.

I have the honor to be, Sir, your obedient servant,

A. A. C. LARIVIÈRE,
*Minister of Agriculture, Statistics and Health.*

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OFFICE OF AGRICULTURE, PROVINCE OF NEW BRUNSWICK,
FREDERICTON, 3rd March, 1884.

SIR,—Your communication addressed to the Hon. Provincial Secretary, requesting information relative to the laws of this Province for the encouragement of agriculture, has been handed to me, with directions to reply thereto.

1. There is a Board of Agriculture established by Act of Assembly, which takes charge of agricultural affairs and supervises the local societies. This Board consists of six members, nominated by the agricultural societies, and a chairman appointed by the Government, who must be one of the Government holding a Department, and a secretary. For the purposes of this Act the Province is divided into six districts, nominating one member each. I may here state that it is at present intended to amend the law during the present Session, increasing the members of the Board to fifteen—one from each county.

2. The Act of Assembly provides for four societies in each county, and grants $800 to be divided among the four societies on their list of subscriptions. There are fifteen counties, and all have four societies except one county having two—there are therefore fifty-eight societies.

3. There are no agricultural statistics made up except the meagre returns by the secretary of the agricultural societies, which you may see in the reports. These returns are quite unreliable for any public information, they are not paid for, and are made up by the secretary without any enquiry and without visiting the district. The question of collecting agricultural statistics has been taken up several times, with us, but never resulted in any practical arrangement. The want of money to pay the collector is the principal difficulty. Reliable returns would be invaluable. I trust something may be done to furnish these returns which are so much wanted.

4. I have sent you two copies of the Acts of Assembly relating to agriculture, and reports for all the years in which they were issued, that are available. That for 1883 will be ready in a few days, when I will forward it also.

As mentioned above, the Government are about introducing a Bill into the Assembly to consolidate and amend the present laws. It is not probable that the changes will be material, beyond increasing the number to fifteen. Grouping two or three societies to form one district has not been found to work well.

5. Some three years since the Government imported a number of cattle, sheep and swine and placed about 30 cattle, 40 sheep and 6 swine on a farm, as the beginning of a stock farm. With the exception that the farm selected has not proved suitable, this act on the part of the Government is much approved, and the short experience we have had of it shows that we can supply our farmers with a larger number of fine animals for the same amount of money than by importing.

I neglected to mention in the fourth paragraph that a copy of the rules and regulations for the government of the Board of Agriculture will be found along with the Acts of Assembly now sent.

I am not aware of any other information that would be of service to the Committee, but should anything more be required, it will be cheerfully furnished, so far as it is possible.

I am, your obedient servant,
JULIUS L. INCHES, *Secretary*

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DEPARTMENT OF AGRICULTURE AND PUBLIC WORKS,
QUEBEC, 18th March, 1884.

SIR,—At your request I beg leave to forward my answers to the queries of your Committee. If all right-thinking men admit that the basis of a truly National Policy consists in securing for the whole country the most profitable agriculture, as the surest, and in fact the only mode of rendering all other national industries permanently successful, your Committee will, I trust, see how truly statesman-like was its organization, and how useful the work in hand.

My answers are numbered and refer to the same numbers in your queries:

### *First Query—Farmers' Disadvantages.*

Principally from want of knowledge of his trade, and of the requirements of local as well as of foreign markets. The loss thereby occasioned to the Dominion, as well as to the farmers themselves, is stupendous, and equals annually the whole agricultural production of Canada—a loss amounting to over two hundred millions of dollars every year. In other words, our farmers, in the aggregate, do not produce over one-half of what they might and should.

*Total Estimated Annual Value of Agricultural Produce.* (See table of agricultural statistics annexed.)

| | | |
|---|---|---|
| Horses, $\frac{1}{10}$ of total value of stock | $ | 5,831,420 |
| Cattle, killed or sold only | | 16,442,025 |
| Sheep do do | | 7,482,325 |
| Swine do do | | 19,537,545 |
| Wool and honey | | 3,012,758 |
| (1) Total animal produce mentioned in Census | $ | 52,306,073 |
| Dairy produce | | 21,442,507 |
| Hay | | 30,334,860 |
| Grains and hay seeds | | 92,016,246 |
| Roots | | 22,594,841 |
| Grand total (at a low estimate) | | 218,794,528 |

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(1) Many items of agricultural production are not even mentioned in the Census, poultry and eggs, for example. Yet this item cannot be less than $10,000,000 annually.

We have also no statistics showing what grain and hay, &c., are used on the farm to support both the farmer's family, his stock, &c. All these and more are needed.

Our wheat production in Canada (see Census of 1881), taking in our North-West and the large proportion of new lands still being reclaimed from the virgin soil and put into wheat in all the older Provinces, only averages 13¾ bushels per acre, whilst that of Great Britain, and other equally well-farmed European countries, exceeds 28 bushels, after centuries of productiveness. Our production of coarse grains is in a still smaller proportion, and yet all agriculturists who know Canada agree that our soil and our climate favor the highest agricultural production in the world, under a proper system of tillage.

There is certainly a remedy to this deplorable state of things. The most flourishing countries have suffered as we do now. But this remedy, to be more or less complete, lies in the power of the State alone. What is imperatively wanted is practical instruction in agriculture in general. Such instruction should be carried to the Canadian farmer, as it has been so successfully to the Danish, the Belgian, the French, and to the peasantry of so many other countries. In my opinion, even one hundred thousand dollars, carefully expended annually for the purpose of such technical instruction, would certainly, and even very soon, be returned to the Federal treasury many fold, after producing to the country at large at least one hundred fold.

### *Second Query—Cereals.*

They are, generally, out of all proportion in good farming, and without anything like sufficient recuperation to the soil, thereby impoverishing and, too often, ruining the land. And yet, with a more rational system of farming, the quantity of cereals produced could be at least doubled, even on a much smaller acreage.

### *Hoed Crops—Roots and Maize.*

The total area in hoed crops of all kinds does not exceed 4 per cent. of all the land in cultivation (1). Now, all good farmers know that the soil cannot be kept clean and properly pulverized, so as to produce the largest returns, without hoed crops—or its costly equivalent—summer fallows. In all well farmed-countries the proportion of hoed crops, to the land in cultivation is certainly 10 per cent., and often much more. Maize or Indian corn, one of the most profitable and easiest grown hoed crops of America, is certainly not sufficiently valued in Canada, although it very properly forms the basis of all farming, in even the most northern parts of the United States. Under the right culture, that is with an abundance of manure, and extensive horse cultivation, and with a proper selection of seed suited to our northern climate, we can easily produce an average of from 75 to 100 bushels of corn per acre, costing the farmer less than 25 cents a bushel, besides from 3 to 4 tons of excellent fodder, if well cured and properly prepared. As cattle food alone, corn for fodder comes here to perfection, and when cultivated with intelligence, and fed in connection with other food, it is the cheapest and one of the best articles of diet for the production of milk, or of flesh in growing animals.

### *Grasses.*

The use of mixed grasses—outside of timothy and clover—is hardly known to our farming community. And yet, what we want, in our pastures especially, is the production of a variety of food, at all seasons of growth, more palatable to the cattle, and more profitable to the farmer.

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(1). The Census of 1881 gives as improved land 21,899,181 acres, of which 464,229 acres are in potatoes. It does not give the acreage in corn or in other root crops. However, the quantity of corn grown is given in bushels at 9,025,142, and roots at 48,241,341. Now, allowing 30 bushels of Indian corn to the acre, and 500 of roots, the total acreage in hoed crops, including potatoes, would be 861,549 acres, or about 4 per cent. of the total improved land.

### *Raising of Stock.*

(See Agricultural Statistics annexed to 1st Query.)

It can be demonstrated, without cavil, that the cash value of our farm stock in general, and the annual returns therefrom, could be at least doubled, even in a few years: 1st. By better selection; 2nd. By a more rational system of feeding, in summer as in winter. Such a result implies a very possible and attainable increased value in capital, amounting to at least one hundred and fifty millions of dollars, and an annual production, over that at present, which would amount to the enormous sum of fifty millions of dollars!

*Lowest estimated value of Farm Stock in Canada.*

| | |
|---|---|
| Horses and colts | $59,531,420 |
| Working oxen | 3,977,790 |
| Cows | 39,898,000 |
| Other cattle | 26,798,940 |
| Sheep | 15,243,390 |
| Pigs | 10,868,571 |
| | $156,318,111 |

### *Eggs:*

No stronger argument could, in my opinion, be used to show now much our agricultural production might be increased, by a little fostering care, than the production of eggs in Canada. These are so abundant all over the country that they form an important element of diet, even in the poorest cottage in the land. And yet, how many farmers count the egg crop as of any account on the farm? Not so, of course, with the good house-wife, who gratefully accepts from her lord and master these her modest perquisites. She feeds a few birds, really of no account as compared with the enormous capital invested in our farm stock; she teaches her children to look carefully after the eggs—and lo! not alone is the whole country abundantly supplied with royal food, but our exports of eggs are 40 per cent. above the value of all our exports in horses, or of sheep. Even the fat stock, requiring so many steamers to carry them over to Europe, do not produce over 75 per cent. more money than our exports of the so much despised egg crop.

*Agricultural Exports,* 1882-83. (See Trade and Navigation Returns, 1883.)

| | |
|---|---|
| Horses | $1,633,291 |
| Bovines and their produce in meat, &c | 3,941,261 |
| Sheep " " " | 1,709,569 |
| Swine " " " | 588,972 |
| Butter | 1,705,817 |
| Cheese | 6,451,870 |
| Eggs | 2,256,586 |
| Other animals and their produce | 909,454 |
| Total animal exports (not furs) | $19,196,820 |
| " field products | 22,818,519 |
| Total agricultural exports | $42,015,339 |

*Canadian Exports of Hay and Coarse Grains.* (See Trade and Navigation Returns, 1883.)

| | | |
|---|---|---|
| Exports in barley | | $ 6,293,233 |
| " " peas | | 2,161,708 |
| " " other coarse grains | | 1,554,183 |
| | | $10,009,124 |
| Hay, 1881 | $1,818,560 | |
| " 1882 | 915,691 | |
| " 1883 | 902,105 | |
| | $3,636,356 | |
| Average of three years | | 1,212,115 |
| | | $11,221,239 |

### *Horses.*

Respecting horses, when the demand for really good horses, both draft and driving horses, is so great in Europe and in the United States, and when our facilities for the raising of the best horses in the world are considered, it is most painful to observe how comparatively small are the returns from this source. We export hay and coarse grains enough to raise easily ten times more horses than we do at present, for exportation. Why not keep this coarse feed, raise excellent horses—for no one wants bad or poor horses—and benefit from the very high profits in so doing? besides securing for the farm the not to be despised manure.

When we consider what continued efforts the Governments of England, France, Germany and Russia, without mentioning minor States, have made in order to improve the raising of horses, and the mighty results obtained, we may well affirm that this subject deserves to be made a State matter. However, I cannot do more than make mention of it here.

### *Cheese.*

It is admitted, on the highest authority, that only 10 per cent. of the whole make of Canadian cheese is of the best; 25 per cent. of our total production sells at from 1 cent to 2 cents a pound less than the best; and the balance, 65 per cent., from 2 cents to 6 cents a pound less! Now, taking 70,000,000 pounds as our total make of cheese, the actual loss, from our not knowing how to make the best article, amounts to fully $3,000,000 annually.

### *Butter.*

According to the Census (1881), our butter factories produced only a total value of $341,478, or about 1,500,0000 pounds. The home-made, or dairy butter, amounted 102,545,169 pounds.

It is admitted that whilst we have in Canada, through cold water and ice, every facility for the production of the best butter, not over 10 per cent. of this home made butter is of the best quality, whilst the balance sells fully 10 cents a pound below the full price of excellent butter in Canada, which shows a direct loss of $9,250,000 to the farmers and to the country on butter made annually. Moreover, what is lost from want of proper appliances to remove all the butter from the milk certainly amounts to 15 per cent. at the very least, on the whole make of dairy butter, causing an additional loss of over $3,000,000.

I sincerely believe that there is no exaggeration in the statement that Canada and Canadians actually loose over $15,000,000 annually, on their butter and cheese industry alone, as now made, besides what they fail to make. (1)

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(1) A paper on commercial dairying in Canada is annexed, as showing the commercial features of this question of butter and cheese.

Taking the number of cows in Canada as given in the last Census, 1,595,800, and allowing 2½ pounds of cheese to 1 pound of butter, and from 8 to 9 ounces daily of milk to the whole population, we find that our cows do not produce an equivalent or 100 pounds of butter per cow, whilst there is no reason why we should not make 200 pounds per cow, or at 20 cents a pound, $32,000,000 more.

Through Government efforts, sustained by thorough patriots, and principally through one man, Prof. Segelcke, Denmark, has obtained these very results in the last forty years, viz.: It has improved the quality of its butter to the value of more than 20 cents a pound, and it has more than doubled, in fact, nearly tripled, the quantity produced per cow. (2)

I beg leave to call the attention of your Committee to one fact of great importance, respecting dairying as compared with beef fattening, which does not seem to be sufficiently known or valued in Canada. It is this, that it takes about as much food to produce a pound of meat, live weight, as it does of butter. This has been clearly proved in Denmark, more especially, by the weighing of all the food given to a large herd of cows during a whole winter, and the milk and butter produced, weighing with equal care the food given to a number of fattening oxen, and the meat produced during the same space of time (see Report of the Royal Agricultural Society of England, 1876, page 341). In the case in point, the food which produced a pound of meat, live weight, on an average, the season through, produced 2½ pounds of milk from which two-thirds of a pound of butter was made and 1⅓ pounds of partially skimmed cheese, which is fully equal to over a pound of butter.

### *Fruit.*

There is certainly much room for improvement in fruit raising, considering the great national facilities Canada possesses for the economical production of fruit. However, there is evidently a lively interest being developed on this subject at present, for which much credit is due to Charles Gibb, Esq, of Abbottsford, Que., amongst others.

### *Fertilizers.*

Farm manure is certainly wasted to the extent of 75 per cent., and from this source alone we lose one-half of what our lands would otherwise produce with the same labor and capital. The liquid manure, which is worth more than the solid matter, is mostly all lost; then the solids are eave-washed, burned or fire-fanged before carting to the field, and there too often sun dried. As generally treated by nearly all farmers in Canada, manure goes to waste, to a greater or lesser degree, but aggregating to 75 per cent., as I believe can be proved unquestionably. As long as this waste is allowed, but little interest can be given to the very important question of artificial fertilizers.

### *3rd Query—Seeds.*

Interchange of Canadian seeds, of the best quality only, and from west to east, and possibly from east to west, should prove of great value. This can be encouraged with little risk and without expense. Most careful experiments with foreign seeds often prove of inestimable benefit, but they require more time and money, as well as very careful supervision.

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(2) Whilst the average prices for butter in Canada range from 15 cents to 25 cents a pound, according to quality, it has been shown (See the Royal Agricultural Society of England's Report, 1876, page 330) that the prices in Denmark, at the farmers' door and for the English market, range from 19 cents to 38 cents. And yet, from want of direct communications, freight and charges are nearly as high as with us, amounting in all from Canada to not over ½ cent a pound. Now, our very best butter is *not inferior to the best Danish*, as some of our makers have passed several months in Denmark to learn how they could improve our Canadian butter. In fact, the enormous difference in prices between Canadian best and best Danish, is mainly due to the reputation acquired and to the steady supply of Danish butter on the English markets, and to the very uncertain supplies from Canada.

Again, the production of butter per cow in Denmark in 1841 was 85 pounds, on an average, per year, and 94 pounds of skimmed cheese, whilst in 1872 it was 215 pounds of butter and 300 pounds of cheese per cow. (See Royal Agricultural Society's Report, 1876, page 352.)

### *4th Query—Inspection and Branding of Butter and Cheese.*

I think not. Butter and cheese are sold on their merits, by appearance and taste, and are packed in such a way as to be easily examined. But what is very much required is a system of practical inspection of all cheese and butter factories by an excellent teacher in the making of the very best articles. These visits have obtained most excellent results where tried, in Ontario and in Quebec, under the auspices of the Diarymen's Associations. One short stay of a few hours in a factory, whilst cheese is being made, has enabled the inspector to show where the error lay, causing a loss of from 1 cent to 6 cents per pound on the cheese made during a whole season, a loss often greatly exceeding $1,000 in each factory.

Such teachers could, at the time of their visit, cause the farmers to be brought together, and then and there a practical lesson, or lessons, in all that pertains to the dairy might be given with extraordinary results. With the proper appliances at hand, a qualified instructor can teach, in one lesson, how the best butter is produced, and in a few more hours, how good dairy cheese is made. This system of practical teachings carried to the farmer, and supported by printed tracts, has obtained wonderful results wherever tried, in France, Belgium, Denmark, &c., and lately in Ireland.

Such inspections and conventions might be organized in such a way as not to cost $10 per day all told. Notes might also be taken, at the same time, of the general state of agriculture in the localities visited, by calling on one or more of the best farmers; and the results of such visits, under proper direction from a central Bureau, should become of inestimable value to the country.

5th. Of very great benefit, provided the party in charge was thoroughly fitted for such works. 6. Analysis of soils, so far, I believe, have generally proved of very little, if of any use; but it is entirely different with the analysis of artificial fertilizers. It is universally demonstrated that such manures cannot become of general use until they are sold on their true merit, as guaranteed by a respectable chemist holding an official position for such control. 7. Such establishments, when under proper supervision and direction, must prove of inestimable value. However, one only could hardly be of general benefit throughout the Dominion; although one main establishment, in connection with smaller provincial experimental stations might prove of great benefit. 8. Yes; of insects, for, unfortunately, we have very few birds left, either for good or for evil. 9. The cut-worms (larvæ of the May and other beetles) do perhaps more harm than all others to vegetables and even to young grain in this Province. 10. Unfortunately, in our Province, nothing of any practical account has ever been attempted. 11. The loss from various insects, to each of the above products, is certainly incalculable. I have knowledge of whole fields of turnips being re-sown as many as three times and destroyed by the turnip fly. The same of cabbages, &c., &c. Apples were mostly a total failure for the last two years. 12. Yes; the tent caterpillar has done great damage to forest trees, last year especially. 13. A good entomologist—if of a practical turn of mind—could do untold good. 14. Certainly; when such diseases are reported as contagious, especially. Another great benefit which might be derived from this staff would be in the possible inspection of stallions, were the Government to take action in the fostering of horse raising of a better kind. Dr. McEachran's suggestion, of putting on a heavy tax on all stallions unfit for useful reproduction, appears to me invaluable, if intelligently acted upon. 15. Timber is being destroyed, unmercifully, all over the Province, in nearly all the settlements where there is still a good supply. In the older settlements, timber is becoming very scarce and expensive. Many municipalities are so situated that the inhabitants have to travel fifteen to eighteen miles to bring home a load of wood. Yet no systematic effort has so far been made.

of any account, to check its alarming scarcity. 16. The Quebec Government policy, with its Arbor Day and improved regulations regarding forestry, gives promise of future good. The Honorable Mr. Joly's efforts, those of Mr. James Little, and those of Mr. J. C. Chapais, deserve a most honorable mention. However, this can only be termed "a modest beginning." 17. A beginning was made last year through the Province. The results are encouraging, as proving that the public feels the importance of the subject. A fair success was obtained with the trees planted. We want now a regular organization all through the Dominion, so that statistics can be obtained and information given from every municipality in the country. Without such organization it is impossible to obtain any correct data of a general nature, either in tree planting or on any other subject. 18. Yes; my previous answers go to show that this organization, if well made, would be of incalculable good to the Dominion, and that great improvement in the general agriculture of the country cannot be obtained without it. However, too much must not be attempted at first, nor expected from such a Bureau. Certain results, of the most pressing nature, should be aimed at, and all efforts centered on these until success was attained, and so on, step by step. The danger of such Bureau is in attempting too much at first; going to enormous expense, and drifting into more or less complete uselessness. 19. Undoubtedly; however, very short and pithy tracts, on separate subjects, should, in my opinion, do more good than the immense volumes published at Washington. The distribution of such printed should also be made with care and only where useful. Possibly, a small charge for such information would cause it to be better appreciated. At all events, there is great danger of drifting into enormous printing expenses on this score. 20. Yes; by all means, as a part of the Central Bureau and under the one direction. The producer would thus find out, in many ways, how his management compares with that of other Canadians situated exactly as he is, and the result would create an animated competition by which untold wealth should be extracted from the soil. 21. I would much prefer occasional publications of undoubted importance, to rigid monthly bulletins, which are certainly costly, but not always useful. 22. It strikes me that a thorough system of collecting statistics, and distributing valuable information to farmers all through the country, could be obtained through the secretaries of municipalities. Such a system, if regulated by special laws emanating from the Local Legislatures, need cost but comparatively little, and could be made thoroughly effective: 1st, by complete supervision from a Central Bureau, and 2nd, by heavy penalties strictly enforced.

ED. A. BARNARD,
*Director of Agriculture, Department of Agriculture, Quebec.*

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*Translation.*

Answers to Questions 8, 9, 10, 11, 12 and 13 of the Circular of the Select Committee on Agricultural Industries:

The insects which are doing more or less damage in the Province of Quebec are the following:

| | | |
|---|---|---|
| Cut worm | Agrotis messoreia | Agrotis (ver blanc). |
| Cabbage flea | Haltica | Altise. |
| Onion maggot | Anthomyia ceparum | Anthomie de l'ognon. |
| Currant geometer | Ellopia ribearia | Arpenteur. |
| Pea weevil | Bruchus pisi | Bruche des pois. |
| Curculio | Conatrachelus nenuphar | Charancon du prunier. |
| Tent caterpillar | Clisiocampa Americana | Chenille à tente. |
| Forest tent caterpillar | do Sylvatica | Chenille à tente des bois. |

| | | |
|---|---|---|
| Potato bug | Doryphora decemlineata | Chrysomèle des pommes de terre. |
| Imported saw-fly | Nematus ventricosus | Nematé. |
| Cabbage butterfly | Pieris rapae | Papillon des choux. |
| Appletree plant louse | Aphis mali | Pou du pommier. |
| Codling worm | Carpocapsa pomonella | Pyrale de la pomme. |
| Striped borer | Saperda candida | Saperde blanche. |
| Five-spotted sphinx | Sphinx quinque maculatus | Sphinx à cinq taches. |

The plants which suffer from the ravages of these insects are:

Forest trees, fruit trees, currants, onions, apples, gooseberries, potatoes, cabbages, turnips, pease, plums, tobacco.

The following is a classification of the losses occasioned in our Province:

FOREST TREES.—They have been seriously affected within the last few years by the forest-tent caterpillar.

FRUIT TREES GENERALLY.—They have been attacked by striped borer and the tent caterpillar. The tent caterpillar is already doing great injury in the western part of the Province, and is beginning to invade the eastern portion. The striped borer is doing its destructive work nearly everywhere, and has now imperilled the existence of many of our orchards.

CABBAGES AND TURNIPS.—The cabbage flea is a dangerous enemy to these plants. The cabbage plant is, moreover, liable to the attacks of the cabbage butterfly and the cut worm. The cut worm does considerable damage to the young cabbage and turnip plants. The cabbage butterfly did so much damage that it prevented the growing of cabbages for several years. It shows signs of disappearing now. The cut worm is doing great harm also, and is very difficult to overcome.

CURRANTS AND GOOSEBERRIES.—These shrubs are every year, and nearly throughout the whole Province, a prey to the currant geometer and the saw-fly. These insects rendered the cultivation of currants and gooseberries all but an impossibility, until a remedy was found in the use of Paris green, mixed with plaster, in the proportion of 1 lb. of green to 100 lbs. of plaster.

ONIONS.—The onion has for some years been a prey to the onion maggot in certain parts of the Province. Wherever the maggot takes up its quarters, the growing of onions must cease.

POTATOES.—The potato has for nine years past been a prey to the potato bug. The mixture of Paris green and plaster, above indicated, is an effectual remedy.

PEASE.—The pea crop is beginning to suffer from the ravages of the weevil, and in some places has been nearly destroyed.

APPLES AND APPLE TREES.—The tree is liable to the assaults of three insects, which inflict serious injury. The *plant louse* attacks the leaves and young shoots. It is doing extensive injury in the western part of the Province, and is beginning to invade the east. The codling worm attacks the fruit. Lastly, the striped borer assaults the tree itself and bores its way through the wood. Last year and this year the cut worm has certainly injured the whole apple crop to the extent of one-half. The losses inflicted by the other two insects are not so great, but seem likely to become considerable.

PLUMS.—In the western part of the Province the fruit of the plum tree is being destroyed by the curculio. There is reason to fear that this insect will cause as much loss here as it did first in the United States, and then in Ontario.

TOBACCO.—Complaint is made in some places of danger to the crop from the spotted sphinx. However, the insect has not as yet become widely diffused, and it is easily destroyed.

There are many more or less effectual remedies against these insects, but they are not extensively used. Specialists strive to diffuse a knowledge of injurious insects and of agents for their destruction, but they find the public indifferent. In fact the people have yet to be educated in this matter.

Undoubtedly the appointment of an entomologist, and the circulation of short pamphlets giving concise and simple instructions for the destruction of injurious insects, would do great good.

J. C. CHAPAIS, Jun.,
*Department of Agriculture, Quebec.*

## COMMERCIAL—DAIRYING IN CANADA (1).

In 1858 our exports of cheese were purely nominal, amounting, for that year, to $1,497.00. The following year they increased over 200 per cent.; again, in 1860, the increase is nearly 400 per cent. in twelve months—and so on, in a wonderful manner, to this year, when the increase in our exportation is estimated at 25 per cent. over that of last year—itself the largest on record.

Exportation of Cheese from Canada. (See Trade and Navigation Reports.)

| Year. | Lbs. | Value. | Year. | Lbs. | Value. |
|---|---|---|---|---|---|
| | | $ | | | $ |
| 1858 | 13,104 | 1,497 | 1873 | 15,208,633 | 2,280,412 |
| 1859 | 36,156 | 4,667 | 1874 | 24,050,982 | 3,523,201 |
| 1860 | 124,320 | 16,199 | 1875 | 32,342,030 | 3,886,226 |
| 1861 | 294,336 | 23,937 | 1876 | 37,885,286 | 4,050,008 |
| 1862 | 491,680 | 49,226 | 1877 | 37,700,921 | 3,897,965 |
| 1866 | 974,736 | 123,494 | 1878 | 39,371,139 | 4,121,301 |
| 1868 | 1,577,072 | 193,554 | 1879 | 49,616,415 | 4,034,750 |
| 1869 | 6,111,482 | 117,943 | 1880 | 43,441,112 | 4,094,046 |
| 1870 | 5,827,782 | 674,486 | 1881 | 54,713,020 | 6,091,534 |
| 1871 | 8,271,459 | 1,109,906 | 1882 | 55,325,167 | 5,979,537 |
| 1872 | 16,424,025 | 1,840,284 | 1883 | 58,041,387 | 6,451,870 |

Now, if we turn to our butter trade in the past and compare it with the present, we, unfortunately, have no reason for congratulation, but the reverse.

In 1862, before Confederation, the united Provinces of Ontario and Quebec, alone, exported more butter than the whole Confederation of Canada does now; the figures being, for 1862, a total of 8,905,578 lbs., whilst for 1883, a total of 8,106,447 lbs.

It is true that 1882-83 has been an exceptionally bad year for butter experts, the decrease from the previous year being no less than 46 per cent., our exports for 1881-82 reaching over 15,000,000 lbs., whilst in 1880, they were nearly 19,000,000 lbs

Exportations of Butter from Canada. (*See* Trade and Navigation Reports.)

| Year. | Lbs. | Value. | Year. | Lbs. | Value. |
|---|---|---|---|---|---|
| | | $ | | | $ |
| 1858 | 3,721,200 | 480,712 | 1873 | 15,205,663 | 2,208,979 |
| 1859 | 3,750,296 | 526,250 | 1874 | 12,233,046 | 2,620,305 |
| 1860 | 5,512,500 | 792,621 | 1875 | 9,268,044 | 2,337,324 |
| 1861 | 7,275,426 | 841,646 | 1876 | 12,392,367 | 2,579,431 |
| 1862 | 8,905,578 | 1,132,772 | 1877 | 15,479,550 | 3,224,981 |
| 1866 | 10,448,789 | 2,094,270 | 1878 | 13,504,117 | 2,474,197 |
| 1867 | 10,817,918 | 1,741,291 | 1879 | 14,536,246 | 2,138,447 |
| 1868 | 9,958,448 | 1,587,728 | 1880 | 19,887,703 | 3,119,162 |
| 1869 | 10,853,268 | 2,342,270 | 1881 | 17,820,278 | 3,611,888 |
| 1870 | 12,259,887 | 2,353,570 | 1882 | 15,338,488 | 2,975,170 |
| 1871 | 15,439,266 | 3,065,229 | 1883 | 8,106,447 | 1,705,817 |
| 1872 | 10,068,448 | 3,612,679 | | | |

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(1). A paper read, by special request, at the Western Dairymen's Convention, London, Ont., on the 14th February, 1884, and at Peterborough, Ont., on the 21st February, 1884, before the Eastern Ontario Dairymen's Convention, by Ed. A. Barnard (Director of Agriculture at the Department of Agriculture and Public Works, Quebec).

We see by the table just quoted that our butter trade has been at a stand-still ever since 1871, when our exports were over 15,000,000 lbs.

Now let us look for the main cause of this very unsatisfactory butter trade: At first sight, from the fact that at present, it apparently pays better to make cheese than butter, this alone, to many, seems to explain the falling off in our butter trade. A second and, in my opinion, still better reason for this decrease, is the unsteadiness of the demand for Canadian butter. Let us now look into this latter argument: Our export market for butter is undoubtedly Great Britain. Nearly 80 per cent. of our butter goes there. England wants the best brands alone; poor butter is there, as elsewhere, a drug on the market. Whilst the best brands of imported butter are quoted from 120s. to 144s. per cwt., Canadian and even American brands only reach from 60s. to 122s.

**AVERAGE** of current prices of Butter and Cheese on first Saturday in January in each year, from the latest actual market sales. (*See* "Journal of the Royal Agricultural Society of England," 1883, part 1st, p. xxviii.)

| — | Average Annual Price in the 5 years, 1875-79. | Current Price, 1st January, 1880. | Current Price, 1st January, 1881. | Current Price, 1st January, 1882. | Current Price, 1st January, 1883. |
|---|---|---|---|---|---|
| *Butter.* | Per cwt. | Per cwt. | Per cwt. | Per cwt. | Per cwt. |
|  | s. s. | s. s. | s. s. | s. s. | s. s. |
| Carlow, finest F.O.B | 131 to 144 | 126 to 140 | 120 to 140 | 112 to 138 | 120 to 140 |
| do landed | 138 " 148 | ...... | ...... | ...... | ...... |
| Cork, 1sts | 143 " 148 | 145 ...... | 141 ...... | 136 to 140 | ...... |
| do 2nds | 133 " 137 | 143 ...... | 132 to 135 | 129 " 131 | 120 to 136 |
| do 3rds (new) | 108 " 109 | 115 ...... | 105 ... ...... | 131 " 113 | 120 |
| do 4ths | 90 " 91 | 96 ...... | 78 ... ...... | 82 ...... | 120 " 92 |
| Limerick | 124 " 129 | ...... | ...... | ...... | ...... |
| Foreign— |  |  |  |  |  |
| Friesland | 132 " 137 | 128 to 134 | 120 to 130 | 125 to 144 | 125 to 136 |
| Jersey, &c. | 94 " 134 | 125 " 136 | 110 " 125 | 110 " 140 | 110 " 134 |
| Kiel | 135 " 164 | ...... | ...... | ...... | ...... |
| Normandy | 92 " 151 | 120 to 146 | 108 to 140 | ...... | ...... |
| American | 81 " 121 | 90 " 135 | 95 " 125 | 60 to 122 | ...... |
| Bosch | ...... | 65 " 95 | 65 " 84 | 50 " 85 | 60 " 90 |
| *Cheese.* |  |  |  |  |  |
| English Cheddar, fine new | 72 to 90 | 72 " 86 | 76 to 90 | 76 to 82 | 68 to 82 |
| do good new | ...... | ...... | ...... | ...... | ...... |
| Red Somerset Loaf | 77 to 87 | 74 ...... | 76 to 82 | 74 to 78 | 74 to 76 |
| White or Yellow Cheddar Loaf | 78 " 87 | ...... | ...... | ...... | ...... |
| Scotch Cheddar | 164 " 189 | ...... | ...... | ...... | ...... |
| Cheshire, new | 78 " 86 | 64 to 86 | 74 to 88 | 72 to 82 | 68 to 80 |
| do good new | 53 " 71 | ...... | ...... | ...... | ...... |
| North Wilts Loaf, new | 72 " 81 | ...... | 72 to 82 | 76 to 81 | 74 to 76 |
| Derby Loaf, new | 74 " 64 | 70 to 74 | 76 " 84 | 76 " 84 | 72 " 76 |
| Wiltshire, new | 70 " 79 | 62 " 76 | 70 " 80 | 64 " 74 | 62 " 72 |
| do good new | 60 " 68 | ...... | ...... | ...... | ...... |
| Foreign— |  |  |  |  |  |
| American, fine | 63 " 67 | 64 to 68 | 68 to 72 | 60 to 68 | 62 to 70 |
| do good | 41 " 59 | 56 " 60 | 56 " 66 | 42 " 60 | 46 " 58 |
| Gonda | 52 " 61 | 56 " 62 | 60 " 66 | 56 " 62 | 54 " 62 |
| Edam, new | 56 " 65 | 56 " 64 | 62 " 68 | 57 " 64 | 56 " 64 |
| Gruyère, new | 76 " 85 | 71 " 78 | 62 " 82 | 72 " 75 | 72 " 75 |

If we now turn to the butter exports to England from Normandy, in France, and from Denmark, we find their trade increasing in a most satisfactory manner. Let us take Denmark for example:

Not more than fifty years ago, Danish agriculture was certainly not ahead of ours. All, or nearly all, the grain and hay Denmark then produced, was sold out of the country. Cows were fed on straw all winter, and the butter produced in summer was of very little amount and of poor quality. Now, Denmark sells neither grain nor hay; on the contrary, it imports more grain and oil cake for its cows than the whole country used to export years ago. Cows, instead of giving little butter in summer alone, are made to give an average of 250 lbs. for each cow; many farmers producing annually over 300 lbs. per cow, on an average, on large herds. Moreover, about 70 per cent. of all the cows in Denmark are made to give more butter in winter than in summer, the calving of such cows taking place between September and January.

Although the English cheese market is open to them as well as the butter market, their principal production is, firstly, butter, and secondly, skim cheese.

The following table shows the wonderful increase in butter exports, from Denmark to Great Britain, from 1865 to 1881, or in sixteen years. (*See* "Journal R. A. S., England," 1883, part 1st, p. xxviii.)

QUANTITY and Value of Butter imported into Great Britain from Denmark.

| Year. | Quantity. | Computed Real Value. | Year. | Quantity. | Computed Real Value. |
|---|---|---|---|---|---|
| | Cwt. | £ | | Cwt. | £ |
| 1865 | 65,555 | 362,440 | 1874 | 226,053 | 1,363,433 |
| 1866 | 67,305 | 319,528 | 1875 | 206,171 | 1,275,870 |
| 1867 | 80,589 | 422,479 | 1876 | 205,195 | 1,311,234 |
| 1868 | 79,437 | 471,262 | 1877 | 216,322 | 1,347,791 |
| 1869 | 103,613 | 574,981 | 1878 | 242,427 | 1,517,467 |
| 1870 | 127,013 | 767,190 | 1879 | 281,740 | 1,673,452 |
| 1871 | 140,858 | 803,226 | 1880 | 300,157 | 1,777,176 |
| 1872 | 173,574 | 1,009,322 | 1881 | 279,627 | 1,691,894 |
| 1873 | 201,558 | 1,203,459 | | | |

We see here that whilst our Canadian butter trade has been at a stand-still, and worse, since 1872, the Danish butter exports to the same market as ours have increased steadily by nearly 100 per cent.

If we now compare our exports in butter to England with those of other countries besides Denmark, we find that whilst we are even going back, our competitors are progressing in a most satisfactory manner to themselves.

Thus, Holland has steadily increased its exportations nearly 200 per cent. from 1872 to 1880. (*See* as above, page xxix.)

| Year | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| | Cwt. | £ | | Cwt. | £ |
| 1872 | 269,091 | 1,358,579 | 1877 | 372,134 | 2,084,686 |
| 1873 | 279,004 | 1,453,875 | 1878 | 460,601 | 2,494,903 |
| 1874 | 351,605 | 1,877,755 | 1879 | 655,377 | 3,331,149 |
| 1875 | 357,106 | 1,917,910 | 1880 | 810,509 | 4,076,399 |
| 1876 | 402,984 | 2,252,909 | 1881 | 745,536 | 3,745,885 |

How much of this increase is due to oleomargarine I shall not venture to say, although I believe it to be very large. But from the quoted reports, even this artificial produce from Holland is quoted at much better prices than we can obtain for our butter.

Now, if we compare even American exportations of butter to England, their trade is most satisfactory, whilst ours is going back, as I have already mentioned.

Thus, whilst we exported in 1873-74 over 15,000,000 lbs. of butter, principally to England, the exports of the United States there were little over 4,000,000 lbs. But they doubled every second year or so, until they reached nearly nine-fold in six years (from 1874 to 1879), being then nearly 34,000,000 lbs.

| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| | Cwt. | £ | | Cwt. | £ |
| 1874 | 36,307 | 188,769 | 1878 | 219,794 | 998,766 |
| 1875 | 40,331 | 205,900 | 1879 | 301,054 | 1,243,075 |
| 1876 | 118,131 | 593,122 | 1880 | 277,790 | 1,343,967 |
| 1877 | 188,491 | 920,761 | 1881 | 174,246 | 845,125 |

(*See* as above, page xxix.)

Therefore, if we look for the reason of the unsteadiness of the demand for Canadian butter, we must, no matter how painful the public avowal, admit that the true and only reason is the very poor quality of our butter.

I have asked the largest exporters of butter in Montreal an estimate of the relative proportion of fine butter to poor. They answered that they were not far wrong in the following:—

| | |
|---|---|
| Finest Canadian butter | 5 to 10 per cent. |
| Fine do | 25 to 30 do |
| Poor do | 50 to 60 do |

I leave you, gentlemen, to estimate the amount of loss this means to the country annually. I shall only say, that the butter makers of this country can, right here, stop a leak in their net profits, amounting, in the aggregate, to millions of dollars annually.

Let me now refer back to the very important question as to which pays best, butter-making or cheese-making. I have given you the experience of Holland, and Denmark is the same as ours. It is a remarkable fact, that whilst in Canada farmers think cheese making pays better than butter making, the contrary seems to be the experience of Denmark and Holland. In these countries butter is the principal industry, and what cheese is made comes from milk more or less skimmed. We give here the exports and value of such cheese to England, from Holland alone. By comparing figures, it will be seen that the quantity shipped and the prices obtained for such skimmed cheese, compare most favorably with our exportations of full milk cheese. (*See* as above, page xxix.)

| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| | Cwt. | £ | | Cwt. | £ |
| 1872 | 329,535 | 942,537 | 1877 | 341,980 | 984,855 |
| 1873 | 336,654 | 1,018,233 | 1878 | 355,159 | 1,018,669 |
| 1874 | 398,858 | 1,164,921 | 1879 | 275,039 | 743,107 |
| 1875 | 370,123 | 1,078,594 | 1880 | 288,666 | 810,590 |
| 1876 | 330,435 | 949,413 | 1881 | 264,626 | 747,052 |

In such a study, and in order to arrive at an exact conclusion, you will admit with me, that all the elements of the case must be taken into consideration.

Now, let us see if it would be prudent to increase very largely the production of Cheddar cheese—the only kind made in Canada, as a rule—over what it is at present.

That such production could be increased even ten-fold in a very few years, is to me the more evident that, in our Province alone, not one single cheese factory existed in the French settlements, up to 1872. Now, we produce in those same settlements nearly one-quarter of all the cheese manufactured in Canada. And there is still room for an increase of a hundred-fold. In the Maritime Provinces, where facilities for butter and cheese making are, in my opinion, at least fully equal to those of Quebec, hardly any cheese is exported.

THE following Table showing our total exports in Butter and Cheese, and where exported, is taken from the Trade and Navigation Returns for 1883.

| — | Quantity. | Value. |
|---|---|---|
| **BUTTER.** | | |
| *Great Britain.* | Lbs. | $ |
| Ontario | 1,205,591 | 266,850 |
| Quebec | 5,023,242 | 1,063,458 |
| Nova Scotia | 1,260 | 262 |
| P. E. Island | 80 | 15 |
| | 6,230,273 | 1,330,585 |
| *United States.* | | |
| Ontario | 331,995 | 60,424 |
| Quebec | 626,085 | 139,616 |
| Nova Scotia | 4,485 | 992 |
| New Brunswick | 20,059 | 4,447 |
| P. E. Island | 3,767 | 655 |
| *British West Indies.* | ...... | ...... |
| Nova Scotia | 35,861 | 8,078 |
| P. E. Island | 300 | 60 |
| | 36,161 | 8,138 |
| *Spanish West Indies.* | | |
| Nova Scotia | 1,980 | 370 |
| *Danish West Indies.* | | |
| Nova Scotia | 62,782 | 12,992 |
| *Brazil.* | | |
| Nova Scotia | 105 | 26 |
| *St. Pierre.* | | |
| Nova Scotia | 120 | 20 |
| *Danish West Indies.* | | |
| Nova Scotia | 664 | 82 |
| *French West Indies.* | | |
| Nova Scotia | 1,000 | 100 |
| *British Guiana.* | | |
| Nova Scotia | 9,189 | 1,339 |

| — | Quantity. | Value. |
|---|---|---|
| **CHEESE.** | | |
| *Great Britain.* | Lbs. | $ |
| Ontario | 12,144,134 | 1,356,608 |
| Quebec | 45,528,709 | 5,053,235 |
| P. E. Island | 116 | 14 |
| | 57,672,959 | 6,409,857 |
| *United States.* | | |
| Ontario | 220,945 | 24,960 |
| Quebec | 415 | 91 |
| Nova Scotia | 87 | 7 |
| British Columbia | 12 | 3 |
| P. E. Island | 70 | 7 |
| | 221,529 | 25,068 |
| *Newfoundland.* | | |
| Nova Scotia | 470 | 60 |
| P. E. Island | 5,656 | 567 |
| Quebec | 125,914 | 14,833 |
| | 132,040 | 15,480 |
| *British West Indies.* | | |
| Nova Scotia | 3,551 | 432 |
| New Brunswick | 135 | 17 |
| P. E. Island | 200 | 25 |
| *Newfoundland.* | | |
| Quebec | 387,983 | 73,011 |
| Nova Scotia | 303,029 | 56,097 |
| P. E. Island | 11,021 | 2,233 |
| | 702,033 | 131,341 |
| *St. Pierre.* | | |
| Quebec | 11,606 | 2,308 |
| Nova Scotia | 67,120 | 12,443 |
| P. E. Island | 7,143 | 1,302 |
| | 85,869 | 16,053 |
| *Madagascar.* | | |
| Nova Scotia | 125 | 25 |
| *British Guiana.* | | |
| Nova Scotia | 625 | 125 |
| New Brunswick | 140 | 28 |
| | 765 | 153 |
| *Japan.* | | |
| British Columbia | 67 | 30 |

## RECAPITULATION.

| | | | | | |
|---|---|---|---|---|---|
| Ontario | 1,537,586 | 327,274 | Ontario | 12,365,079 | 1,380,969 |
| Quebec | 6,048,912 | 1,278,393 | Quebec | 45,655,038 | 5,068,179 |
| Nova Scotia | 477,372 | 91,360 | Nova Scotia | 15,081 | 2,090 |
| New Brunswick | 20,199 | 4,495 | New Brunswick | 135 | 17 |
| British Columbia | 67 | 30 | British Columbia | 12 | 3 |
| P. E. Island | 22,311 | 4,265 | P. E. Island | 6,042 | 613 |
| | 8,106,447 | 1,705,817 | | 58,041,387 | 6,451,870 |

Again, gentlemen, if we examine the cheese imports of England, we will observe that they do not increase in that hopeful proportion which we might be led to suppose, from what may have been said in this very convention.

Great Britain imported in—

| | | |
|---|---|---|
| 1879 | 1,789,168 cwts. of cheese. | |
| 1880 ..........(less) | 1,773,503 do | do |
| 1881 ..........(a little more) | 1,834,480 do | do |
| 1882 ..........(considerably less) | 1,692,495 do | do |

The following table shows the agricultural imports into England, and may prove interesting:

**Certain** Articles of Foreign and Colonial production Imported in the Years 1879-82, and their Quantities.

| — | | 1879. | 1880. | 1881. | 1882. |
|---|---|---|---|---|---|
| Animals (living)— | | | | | |
| Oxen, Bulls and Cows | No. | 208,720 | 350,950 | ........ | 309,380 |
| Calves | " | 39,172 | 38,999 | ........ | 4,340 |
| Sheep | " | 944,869 | 940,991 | 935,244 | 1,124,391 |
| Lambs | " | | | | |
| Swine and Hogs | " | 52,267 | 51,030 | 24,273 | 15,670 |
| Bones (burnt or not, or as animal charcoal). | Tons. | 65,067 | 79,740 | 65,007 | 54,401 |
| Cotton, raw | Cwt. | 13,171,043 | 14,547,283 | 14,952,724 | 15,794,566 |
| Flax | " | 1,694,051 | 1,896,249 | 1,791,762 | 1,966,969 |
| Guano | " | 76,945 | 78,965 | 50,072 | 45,095 |
| Hemp | " | 1,204,036 | 1,320,731 | 1,475,421 | 1,354,407 |
| Hops | " | 262,616 | 196,688 | 146,710 | 315,377 |
| Hides, untanned, dry | " | 545,373 | 600,198 | 554,134 | 576,451 |
| do wet | " | 463,086 | 584,693 | 454,295 | 613,593 |
| Petroleum | Tuns. | 170,831 | 152,672 | 234,968 | Galls.<br>59,135,384 |
| Oilseed Cakes | Tons. | 216,002 | 243,998 | 220,790 | 190,252 |
| Potatoes | Cwt. | 9,352,236 | 9,420,263 | 4,034,577 | 2,997,514 |
| Butter | " | 2,045,606 | 2,319,802 | 2,046,421 | 2,167,428 |
| Cheese | " | 1,789,168 | 1,773,503 | 1,834,480 | 1,692,495 |
| Eggs | Great hundreds. | 6,388,838 | 6,238,437 | 6,306,645 | 6,757,234 |
| Lard | Cwt. | 838,997 | 929,616 | 855,796 | 665,885 |
| Bacon | " | 3,996,922 | 4,370,860 | 3,858,855 | 2,343,060 |
| Hams | " | 906,121 | 938,269 | 747,009 | 548,507 |
| Salt Beef | " | 242,864 | 289,422 | 248,698 | 227,748 |
| Salt Pork | " | 400,591 | 389,057 | 349,709 | 266,229 |
| Clover Seed | " | 345,206 | 271,609 | 279,925 | 354,869 |
| Flax Seed and Linseed | Qrs. | 1,665,333 | 1,712,576 | 1,829,838 | 2,437,918 |
| Rape | " | 365,340 | 400,694 | 373,028 | 547,679 |
| Sheep and Lambs' Wool | Lbs. | 411,106,627 | 460,337,412 | 447,044,809 | 463,954,318 |

I do not know what the official figures may be up to last December; but I cannot see that the consumption of cheese in Great Britain had any reason to increase within that time, as high prices on cheese were, on the whole, fully maintained.

If we now consider that we are *crowding* our American friends pretty closely, in cheese, on the English market, we will see at a glance that somebody must suffer, if our increase of production in one kind of chese only continues as it has done in the last ten years. The tendency certainly is towards an increase in a much larger ratio than ever.

1884

## UNITED STATES EXPORTS.

(*See* Trade and Navigation Returns of the United States.)

| Year. | Quantity. | Value. | Year. | Quantity. | Value. |
|---|---|---|---|---|---|
| BUTTER. | Lbs. | $ | CHEESE. | Lbs. | $ |
| 1873 | 4,518,844 | 952,919 | 1873 | 80,366,540 | 10,496,010 |
| 1874 | 4,367,983 | 1,092,381 | 1874 | 90,611,077 | 11,878,995 |
| 1875 | 6,360,827 | 1,506,996 | 1875 | 101,010,853 | 13,659,608 |
| 1876 | 4,644,894 | 1,109,496 | 1876 | 97,676,264 | 12,270,083 |
| 1877 | 21,537,241 | 4,424,616 | 1877 | 107,364,666 | 12,700,627 |
| 1878 | 27,837,117 | 3,931,822 | 1878 | 123,783,736 | 14,103,529 |
| 1879 | 38,248,016 | 5,421,205 | 1879 | 141,654,474 | 12,579,960 |
| 1880 | 39,236,658 | 6,690,687 | 1880 | 127,553,907 | 12,171,720 |
| 1881 | 31,560,500 | 6,256,024 | 1881 | 147,995,614 | 16,380,248 |
| 1882 | 14,794,305 | 2,864,570 | 1882 | 127,989,782 | 14,058,975 |

It has been shown that when every element is considered, and in a series of years, butter making pays the farmer fully as well as cheese making.

The comparative calculation is easily made: 100 lbs. of standard milk will make, in Ontario, 9½ lbs. of cheese or 4 lbs. of butter. Whey is considered of little account, being valued at about 5 cents a 100 lbs.

Therefore, we have—

| | |
|---|---|
| 9½ lbs. of cheese, say 10 cts. net, a very high average = | 95 cts. |
| Whey | 5 |
| Total | $1.00 |
| Butter, 4 lbs., at 20 cts. net | 80 |
| Skimmed milk | 20 |
| Total | $1.00 |

Now, all authorities agree that, in calf feeding or pig raising, sweet skimmed milk is worth *one-half* of the full milk, so 20 cts. *is not* the real value, for a careful farmer. It has been shown in some of the experimental stations under Government control, in the United States, that, under proper care, 100 lbs. of skimmed milk produce 6½ lbs. of pork, live weight. This shows the real value of skimmed milk for meat production.

I shall but mention one more element, and a very important one, in my estimate. Cheese producers are generally of opinion that they had better not raise any heifer calves, but buy milch cows. They may be right in their calculation, that milk at 1 cent per pound is too high to raise common calves with. But, then, where shall we go for milch cows, if cheese producing becomes the rule and butter making the exception? With butter making, as it has been shown here, there is no difficulty in raising *the best* dairy cows on skimmed milk, with a little fattening food added, such as pea or oatmeal, oil cake, &c.

Now, respecting a market for our butter: First, we have our home market, which will increase many fold when really good butter will be the rule instead of the exception. Where is the family, with a cultivated taste for butter, which will accept and consume *poor* butter in any quantity? Those who have tried the experiment know how much butter their own families will consume of good, *really excellent* butter, and how little of poor butter. I do not exaggerate in stating that in such cases the difference is four-fold, and the difference in price 40 per cent.

Then we have the English market, where the *best of butter* is always in demand, and the supply nearly always short. Again, we have all the markets of the world which the United States are just now opening up for us as well as for themselves.

We here see (in the following table) that even Canada imports 274,547 lbs. of butter from the States, and that only about two-thirds of the American exports in butter go to Great Britain. Moreover, that Newfoundland, Labrador, Miquelon and St. Pierre import 549,339 lbs. of butter from the States, which should, evidently, be taken from Canada, if Canadians could supply it.

| Countries to which Exported. | Butter. | Cheese. | Condensed Milk. |
|---|---|---|---|
| | Lbs. | Lbs. | $ |
| Argentine Republic | 1,000 | 140 | 16 |
| Belgium | 126,000 | 224 | ...... |
| Brazil | 425,176 | 6,447 | 1,058 |
| Central American States | 31,393 | 22,467 | 3,465 |
| Chili | 2,802 | 1,165 | 176 |
| China | 25,384 | 26,378 | 10,631 |
| Denmark | 98,763 | ...... | ...... |
| Danish West Indies | 34,508 | 26,672 | 476 |
| France | 311,427 | 21,566 | ...... |
| French West Indies | 82,957 | 7,246 | 16 |
| do Guiana | 1,008 | ...... | 511 |
| Miquelon, Langley and St. Pierre Island | 96,991 | ...... | ...... |
| French Possessions in Africa and adjacent Islands | 1,004 | ...... | ...... |
| do all other | 13,740 | 4,565 | 764 |
| Germany | 1,760,197 | 134,100 | 467 |
| England | 17,147,428 | 119,603,552 | 48,689 |
| Scotland | 6,334,382 | 21,111,543 | ...... |
| Ireland | ...... | 107,300 | ...... |
| Gibraltar | 10,337 | 985 | ...... |
| Nova Scotia, New Brunswick and Prince Edward Island | 30,784 | 250 | 115 |
| Quebec, Ontario, Manitoba and North-West Territories | 130,257 | 5,195,977 | 436 |
| British Columbia | 113,556 | 37,442 | 2,503 |
| Newfoundland and Labrador | 452,348 | 2,687 | ...... |
| British West Indies | 1,661,399 | 495,086 | 10,470 |
| do Guiana | 88,716 | 162,588 | ...... |
| do Honduras | 63,776 | 22,890 | 2,856 |
| do East Indies | ...... | 234 | ...... |
| Hong Kong | 7,061 | 26,954 | 9,514 |
| British Possessions in Africa and adjacent Islands | 73,079 | 2,799 | 43 |
| do Australasia | 749 | ...... | 20 |
| Hawaian Islands | 104,863 | 31,404 | 5,824 |
| Hayti | 426,595 | 129,055 | ...... |
| Italy | 103 | 970 | ...... |
| Japan | 106,306 | 56,808 | 12,589 |
| Liberia | 1,920 | 927 | 183 |
| Mexico | 94,267 | 45,522 | 1,185 |
| Netherlands | 21,032 | 673 | ...... |
| Dutch West Indies | 152,400 | 9,863 | 408 |
| do Guiana | 67,272 | ...... | ...... |
| do East Indies | 300 | 250 | ...... |
| Portugal | 80 | ...... | ...... |
| Azores, Madeira and Cape Verde | 984 | 100 | ...... |
| Russia (Asiatic) | 76,645 | 1,482 | 90 |
| San Domingo | 94,065 | 34,782 | 281 |
| Spain | 200 | 1,822 | ...... |
| Cuba | 306,950 | 71,555 | 14,797 |
| Porto Rico | 245,646 | 247,085 | ...... |
| Spanish Possessious in Africa and adjacent Islands | 602 | 900 | ...... |
| Sweden and Norway | 1,619 | 174 | ...... |
| Turkey in Asia | ...... | 1,030 | ...... |
| United States of Columbia | 269,883 | 47,117 | 10,731 |
| Uruguay | 12,086 | 2,257 | 138 |
| Venezuela | 338,331 | 17,158 | 148 |
| Other countries in South America | 739 | 450 | 32 |
| do Africa | ...... | 110 | 389 |
| All other islands and ports not elsewhere specified | 1,669 | 1,773 | ...... |
| Total | 31,560,500 | 147,995,614 | 139,407 |

I leave you, now, gentlemen, to ponder over this question of the present and future of commercial dairying in Canada. I have shown before this convention, in previous years, how dairying pays as compared with beef raising in Canada. The fact that our world-renowned butter producer of Hamilton, Mr. Valency Fuller, shows us how to produce 850 lbs. of butter in a year, worth 25 cts. a lb., from a cow weighing about 1,000 lbs. live weight, on no more food than it would take to produce 750 lbs. of matured meat, live weight, in an equal space of time, worth 5 cts. a lb., points out distinctly to that side on which the profit lies—between dairying and meat raising*.

Let us now, if you please, ask our Federal Government for the dissemination of all such practical knowledge as will increase the profits of Canadian farmers, on all subjects pertaining to agriculture in general, and also show us clearly where our future markets lay, and we can, hopefully, let the future of Canadian dairying rest with our intelligent Canadian dairymen.

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* Experiments made with great care in Denmark, on large herds, where the food was weighed carefully during a whole winter, proved that the feed required to produce one pound of matured flesh, live weight, actually produced, on an average of forty-six animals, 21 lbs. of milk, from which two-thirds of a pound of butter and one and one-third of a pound of cheese (partially skimmed) were made. *See* "Journal of the Royal Agricultural Society of England," vol. xii, page 341.

## A.—COMPLETE Synopsis of Agricultural Statistics Extracted from Census of 1881:

| DEFINITION. | Prince Edward Island. | | | Nova Scotia. | | | New Brunswick. | | | Quebec. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Quantity. | Acres. | Average per Acre. | Quantity. | Acres. | Average per Acre. | Quantity. | Acres. | Average per Acre. | Quantity. | Acres. | Average per Acre. |
| Land occupied | 1,126,653 | Pasture p. head. (4) ·69⅔ | | 5,396,382 | Pasture p. head (4) 1·82¼ | | 3,809,621 | Pasture p. head. (4) 1·13¾ | | 12,625,877 | Pasture p. head. (4) 1·31 | |
| do improved | 596,731 | | | 1,880,644 | | | 1,253,299 | | | 6,410,264 | | |
| do under cultivation | 467,211 | | | 942,010 | | | 849,678 | | | 4,147,984 | | |
| do in pasture | 126,935 | | | 917,010 | | | 392,169 | | | 2,207,422 | | |
| do garden and orchard | 2,285 | | | 21,624 | | | 11,452 | | | 54,858 | | |
| Total population | 108,881 | | | 440,572 | | | 321,233 | | | 1,359,027 | | |
| Occupying less than 11 acres | 1,188 | | | 12,471 | | | 4,827 | | | 19,159 | | |
| do 51 do | 4,280 | | | 13,536 | | | 8,828 | | | 24,564 | | |
| do 101 do | 5,037 | | | 14,504 | | | 13,323 | | | 47,686 | | |
| do 200 do | 2,517 | | | 10,742 | | | 6,748 | | | 34,723 | | |
| Occupying over 200 do | 587 | | | 4,620 | | | 3,111 | | | 11,740 | | |
| Total occupants | 13,629 | | | 55,873 | | | 36,837 | | | 137,863 | | |
| Horses (1) $60 | 25,182 | | | 46,044 | | | 43,957 | | | 225,006 | | |
| Colts 40 | 6,153 | | | 11,123 | | | 9,018 | | | 48,848 | | |
| Working oxen | 84 | | | 33,275 | | | 8,812 | | | 49,233 | | |
| Oxen, slaughtered, living, &c. $25 | 15,200 | | | 63,389 | | | 35,414 | | | 160,207 | | |
| Milch cows 25 | 45,895 | | | 137,639 | | | 103,965 | | | 990,967 | | |
| Other cattle 15 | 44,743 | | | 154,689 | | | 99,786 | | | 490,119 | | |
| Sheep, alive 5 | 166,496 | | | 367,811 | | | 221,163 | | | 889,833 | | |
| do slaughtered 5 | 58,872 | | | 151,245 | | | 98,743 | | | 436,336 | | |
| Pigs, alive 9 | 40,181 | | | 47,256 | | | 53,089 | | | 329,199 | | |
| do slaughtered 15 | 26,836 | | | 56,259 | | | 59,904 | | | 333,159 | | |
| Total equivalent in cattle (2) | 182,224 | (4) | Head. 3·26 | 503,567 | (4) | Head. 3·69 | 346,195 | (4) | Head. 3·59 | 1,680,529 | (4) | Head. 3·78 |
| Butter, hand made $0 15 | 1,688,690 | | | 7,465,285 | | | 6,527,176 | | | 30,630,397 | | |
| do creamery 0 24 | | | | 501,657 | | | | | | | | |
| Cheese, hand made 0 08 | 196,273 | | | 501,657 | | | 172,144 | | | 559,268 | | |
| do factory 0 09 | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 162,224 | (4) | 3·26 | 503,567 | (4) | 3·69 | 346,195 | (4) | Head.<br>3·59 | 1,680,529 | (4) | Head.<br>3·78 |
| Butter, hand made | $0 15 | 1,688,690 | ...... | ...... | 7,465,285 | ...... | ...... | 6,527,176 | ...... | ...... | 30,630,397 | ...... | ...... |
| do creamery | 0 24 | ...... | ...... | ...... | 501,657 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |
| Cheese, hand made | 0 08 | 196,273 | ...... | ...... | 501,657 | ...... | ...... | 172,144 | ...... | ...... | 559,268 | ...... | ...... |
| do factory | 0 09 | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... | ...... |

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| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Bush. | | | Bush. | | | Bush. | | | Bush. |
| Wheat, Spring, bushels | 1 00 | 546,872 | 41,942 | 13 1/76 | 522,602 | 43,045 | 11¼ | 517,997 | 40,831 | 12·56½ | 1,999,815 | 224678 | 8·98 |
| do Winter do | 1 00 | 114 | | | 6, 619 | | | 3,959 | | | 19,189 | | |
| Oats do | 0 40 | 3,538,219 | ...... | 14·23 | 1,873,1[illegible]3 | ...... | 8·09 | 3,297,534 | ...... | 13·88 | 19,990,205 | ...... | 12·77 |
| Barley do | 0 60 | 119,368 | ...... | | 228,748 | ...... | | 84,18[illegible] | ...... | | 1,751,539 | ...... | |
| Rye do | 0 75 | 307 | ...... | | 47,567 | ...... | | 18,268 | ...... | | 430,242 | ...... | |
| Pease and Beans do | 0 80 | 3,169 | ...... | | 37,220 | ...... | | 43,121 | ...... | | 4,170,456 | ...... | |
| Buckwheat do | 0 50 | 90,458 | ...... | | 339,718 | ...... | | 1,587,223 | ...... | | 2,041,770 | ...... | |
| Indian corn do | 0 60 | 2,603 | ...... | | 13,532 | ...... | | 18,158 | ...... | | 880,169 | ...... | |
| Potatoes, bushels | $0 40 | 6,042,191 | 39,083 | 154·59 | 7,378,387 | 60,192 | 122.60 | 6,961,016 | 51,362 | 135·33 | 14,873,287 | 123,869 | 120·07 |
| Turnips do (6) | 0 10 | 1,198,407 | 2,482 | 500 | 1,006,711 | 2,865½ | 500 | 930,336 | 2,299 | 500 | 1,572,476 | 7,246½ | 500 |
| Other roots do (6) | 0 20 | 42,572 | | | 326,143 | | | 159,044 | | | 2,050,904 | | |
| Flax seed do (3) | 1 00 | 919 | 92 | ...... | 1,793 | 179 | ...... | 7,745 | 1,745 | ...... | 65,995 | 6,599½ | ...... |
| Seed, Timothy and Clover, bushels | 2 50 | 15,247 | ...... | ...... | 8,128 | ...... | ...... | 7,527 | ...... | ...... | 119,306 | ...... | ...... |
| | | | | Tons. | | | Tons. | | | Tons. | | | Tons. |
| Hay, per ton | 6 00 | 143,981 | 119,936 | 1·20 | 587,731 | 519,856 | 1·14¾ | 414,046 | 389,721 | 1·06 | 1,614,106 | 1495,494 | 1·08 |
| Apples, per bushel | 0 35 | 31,501 | ...... | ...... | 908,519 | ...... | ...... | 231,096 | ...... | ...... | 777,557 | ...... | ...... |
| Grapes, per lb | 0 01 | 795 | ...... | ...... | 35,015 | ...... | ...... | 2,108 | ...... | ...... | 158,031 | ...... | ...... |
| Other fruit, per bushel | 0 50 | 2,547 | ...... | ...... | 18,485 | ...... | ...... | 6,122 | ...... | ...... | 155,543 | ...... | ...... |
| Maple sugar, per lb | 0 08 | 25,098 | ...... | ...... | 217,481 | ...... | ...... | 453,124 | ...... | ...... | 5,687,835 | ...... | ...... |
| Tobacco do | 0 15 | 1,367 | ...... | ...... | 1,216 | ...... | ...... | 6,414 | ...... | ...... | 2,356,581 | ...... | ...... |
| Hops do | 0 10 | 10,209 | ...... | ...... | 1,142,440 | ...... | ...... | 15,006 | ...... | ...... | 218,542 | ...... | ...... |
| Honey do | 0 10 | 552,083 | ...... | ...... | 18,677 | ...... | ...... | 760,531 | ...... | ...... | 2,730,546 | ...... | ...... |
| Wool do | 0 25 | 14,945 | ...... | ...... | 24,500 | ...... | ...... | 78,203 | ...... | ...... | 559,024 | ...... | ...... |

## A.—COMPLETE Synopsis of Agricultural Statistics, &c.—*Continued.*

| DEFINITION. | Ontario. | | | Manitoba. | | | British Columbia. | | | Territories. | | | Grand Totals for the Dominion. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Quantity. | Acres. | Av'ge per Acre. | Quantity. | Acres. | Av'ge per Acre. | Quantity. | Acres | Av'ge per Acre. | Quantity. | Acres. | Av'ge per Acre. | Quantity. | Value. |
| | | Pasture p. head. | | | Pasture p. head. | | | Pasture p. head. | | | Pasture p. head. | | | $ cts. |
| Land occupied | 19,259,909 | (4) | | 2,384,337 | (4) | | 441,255 | (4) | | 314,107 | (4) | | 45,358,141 | |
| do improved | 11,294,109 | | | 250,416 | | | 184,885 | | | 28,883 | | | 21,899,18[illegible] | |
| do under cultivation | 8,370,266 | ·85¼ | | 230,264 | ·21⅜ | | 83,657 | ·86 | | 21,214 | ·31 | | 15,112,284 | |
| do in pasture | 2.619,098 | | | 17,197 | | | 98,457 | | | 7,334 | | | 6,395,556 | |
| do garden and orchard | 304,805 | | | 2,955 | | | 2,771 | | | 285 | | | 401,335 | |
| Total population | 1,923,216 | | | 65,954 | | | 49,459 | | | 56,446 | | | 4,324,8[illegible] | |
| Occupying less than 11 acres | 36,221 | | | 284 | | | 1,013 | | | 132 | | | 75,286 | |
| do 51 do | 41,497 | | | 300 | | | 294 | | | 26 | | | 93,325 | |
| do 101 do | 75,282 | | | 579 | | | 195 | | | 16 | | | 156,672 | |
| do 200 do | 42,476 | | | 4,046 | | | 666 | | | 325 | | | 102,243 | |
| Occupying over 200 do | 11,513 | | | 3,868 | | | 575 | | | 515 | | | 36,499 | |
| Total occupants | 206,989 | | | 9,077 | | | 2,743 | | | 1,014 | | | 464,025 | |
| Horses (1) $60 | 473,906 | | | 14 504 | | | 20,172 | | | 9,084 | | | 857,855 | 51,471,300 00 |
| Colts 40 | 116,392 | | | 2,235 | | | 5,950 | | | 1,786 | | | 201,503 | 8,060,120 00 |
| Working oxen | 23,263 | | | 12,269 | | | 2,319 | | | 3,334 | | | 132,593 | 3,977,790 00 |
| Oxen, slaughtered or living $25 | 363,043 | | | 4.936 | | | 13,696 | | | 1,796 | | | 657,681 | 16,442,025 00 |
| Milch cows 25 | 782,243 | | | 20,355 | | | 18,878 | | | 3,848 | | | 1,595,800 | 39,895,000 00 |
| Other cattle 15 | 896,661 | | | 27,657 | | | 67,254 | | | 5,690 | | | 1,786,596 | 26,798,940 00 |
| Sheep, alive 5 | 1,359,178 | | | 6,073 | | | 27,788 | | | 346 | | | 3,048,678 | 15,243,390 00 |
| do slaughtered 5 | 748,972 | | | 1,382 | | | 10 683 | | | 232 | | | 1,496,465 | 7,482,325 00 |
| Pigs, alive 9 | 7,922 | | | 17,358 | | | 16,841 | | | 2,775 | | | 1,207,619 | 10,868,571 00 |
| do slaughtered 15 | 796,548 | | | 18,674 | | | 10,411 | | | 712 | | | 1,302,508 | 19 537,545 00 |
| Total equivalent in cattle (2) | 3,049,770 | (4) | Head. 3.63 | 80,513 | (4) | Head. 3.07 | 194,592 | (4) | Head. 1.81 | 23,072 | (4) | Head. 1.23 | | |
| Butter, hand made $0 15 | 54,862,365 | | | 957,152 | | | 343,387 | | | 70,717 | | | 102,545,169 | 15,381,785 35 |
| do creamery 0 24 | | | | | | | | | | | | | | |
| Cheese, factory 0 09 | 1,701,721 | | | 19,613 | | | 33,252 | | | 1,060 | | | 3,184,996 | 254,799 68 |
| do hand made 0 08 | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat, Spring, bushels ... 1 00 | 7,215,024 | 1,949,135 | Bush. 14 01 | 1,029,378 | 51,293 | Bush. 20·15 | 153,485 | 7952 | Bush. 21·84 | 119,644 | 5678 | Bush. 21·07 | 12,102,817 | 12,102,817 00 |
| do Winter do ... 1 00 | 22,193,067 | | | 4,296 | | | 20,168 | | | 11 | | | 20,247,452 | 20,247,452 00 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total equivalent in cattle (2) | 3,049,770 | (4) | 3.63 | 80,513 | (4) | 3.07 | 194,592 | (4) | 1.81 | 23,072 | (4) | 1.23 | | |
| Butter, hand made ........ $0 15 | 54,862,365 | | | 957,152 | | | 343,387 | | | 70,717 | | | 102,545,169 | 15,381,785 35 |
| do creamery........... 0 24 | | | | | | | | | | | | | | |
| Cheese, factory........... 0 09 | 1,701,721 | | | 19,613 | | | 33,252 | | | 1,060 | | | 3,184,996 | 254,799 68 |
| do hand made ......... 0 08 | | | | | | | | | | | | | | |

| | | | | Bush. | | | Bush. | | | Bush. | | | Bush. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheat, Spring, bushels ... | 1 00 | 7,215,024 | 1,940,135 | 14 01 | 1,029,378 | 51,293 | 20·15 | 153,485 | 7952 | 21·84 | 119,644 | 5678 | 21·07 | 12,102,617 | 12,102,617 00 |
| do Winter do ... | 1 00 | 22,193,067 | | | 4,296 | | | 20,168 | | | 11 | | | 20,247,452 | 20,247,452 00 |
| Oats do ... | 0 40 | 40,209,923 | | 17·08 | 1,270,268 | | 20·84 | 253,911 | | 8·95 | 54,952 | | 16·80 | 70,473,131 | 28,201,252 40 |
| Barley do ... | 0 60 | 14,279,841 | | | 253,604 | | | 79,140 | | | 48,445 | | | 16,844,868 | 10,106,920 80 |
| Rye do ... | 0 75 | 1,598,871 | | | 1,203 | | | 482 | | | 240 | | | 2,097,180 | 1,572,885 00 |
| Pease and Beans do ... | 0 80 | 9,434,872 | | | 8,991 | | | 50,542 | | | 1,291 | | | 13,749 662 | 10,999,739 60 |
| Buckwheat do ... | 0 50 | 841,649 | | | 320 | | | 59 | | | 50 | | | 4,901,147 | 2,450,573 50 |
| Indian corn do ... | 0 60 | 8,096,782 | | | 2,516 | | | 1,433 | | | 1,948 | | | 9,025,142 | 5,415,085 20 |
| Potatoes, bushels............ | 0 40 | 18,893,996 | 181,394 | 104·15 | 556,193 | 4,306 | 129·18 | 473,831 | 3,272 | 147·87 | 89,326 | 811 | 110.14 | 55,268,227 | 16,580,468 10 |
| Turnips do (6) ........ | 0 10 | 33,856,721 | 80,672 | 500 | 149,025 | 396 | 500 | 270,525 | 905½ | 500 | 14,89 | 36 | 500 | 39,059,094 | 3,905,909 40 |
| Other roots do (6) ........ | 0 20 | 6,479,222 | | | 49,096 | | | 82,249 | | | 3,091 | | | 9,192,320 | 1,838,464 00 |
| Flax seed do (3) ........ | 1 00 | 38,208 | 3,820 | | | | | 34 | 3 | | | | | 108,694 | 108,694 00 |
| Seed, Timothy and Clover | 2 50 | 173,219 | | | 303 | | | 857 | | | | | | 324,317 | 810,792 50 |
| | | | | Tons. | | | Tons. | | | Tons. | | | Tons. | | |
| Hay, per ton .................. | 6 00 | 2,038,659 | 1 795,965 | 1·14$\frac{5}{12}$ | 185,279 | 100,591 | 1·84 | 43,898 | 28,44 | 9 152½ | 17.500 | 8,337 | 2·10 | 5,055,810 | 30,334,860 00 |
| Apples, per bushel ........ | 0 35 | 11,400,517 | | | 190 | | | 28,100 | | | 175 | | | 3,377,655 | 4,682,179 25 |
| Grapes, per lb. ............... | 0 04 | 3,697,555 | | | 13 | | | 2,961 | | | 30 | | | 3,896,508 | 155,860 32 |
| Other fruit, per bushel ... | 0 50 | 614,707 | | | 1,483 | | | 12,347 | | | | | | 20,556,049 | 420,609 00 |
| Maple sugar, per lb ........ | 0 08 | 4,169,706 | | | 2,796 | | | 9 | | | | | | | |
| Tobacco do ......... | 0 15 | 160,251 | | | 2,037 | | | 96 | | | | | | 2,527,962 | 379,194 30 |
| Hops do ......... | 0 10 | 615,967 | | | 1,835 | | | 24,899 | | | 72 | | | 905,207 | 90,520 70 |
| Honey do ......... | 0 10 | 6,013,216 | | | 16,452 | | | 85,148 | | | 320 | | | 11,300,736 | 2,825,184 00 |
| Wool do ......... | 0 25 | 1,197,628 | | | 1,080 | | | 365 | | | | | | 1,874,745 | 187,574 50 |

(1). The prices indicated are purely conjectural, there being nothing positive to guide us in the estimate we have made; nevertheless, they are based on the best information we have, and are put at the very lowest figure, in order to show the approximate total of the value of stock and crops.

(2). I have established this equivalent by counting 2 colts, 2 head of cattle other than working cattle and cows, 5 sheep and 3 pigs, as equivalent to 1 horse, 1 bull and 1 cow.

(3). The Census only gives the total (bushels) of grain harvested, without giving the number of acres covered by each kind. In order to find the average per acre we have added all the grain harvested, other than wheat, and taken average per acre for all the land under cultivation, less that under hay, vegetables and flax. This is the average in bushels given for the grain mentioned. Flax seed is estimated at 10 bushels per acre.

(4). Unfortunately the Census does not distinguish between farm stock proper and other animals of like species belonging to non-farmers. Hence it is impossible to ascertain how many head of large stock the farmers keep per 100 acres of land, and how much pasture is needed per head. The figures we have given show that the Census is of no value as a complete collection of agricultural statistics.

(6). The number of acres in roots, other than potatoes, is given on the supposition that each acre has yielded 500 bushels. I have made this estimate in order to ascertain approximately the number of acres and the yield per acre of the same crop, as the Census does not give it.

ED. A. BARNARD,
*Superintendent of Agriculture.*

DEPARTMENT OF AGRICULTURE AND PUBLIC WORKS,
QUEBEC, 18th March, 1884.

*To the Special Agricultural Committee at Ottawa:*

ONTARIO AGRICULTURAL COLLEGE AND EXPERIMEMTAL FARM,
28th February, 1884.

GENTLEMEN,—I have the honor to acknowledge the receipt of your favor of the 18th inst., in which you desire certain information, by a series of questions, as to the best means of encouraging and promoting the agricultural interests of the Dominion.

It affords me much pleasure to respond to this invitation, and the single regret is that writing does not impress the importance of a point so well as verbal explanation.

I shall take up the subject in the order given in your communication.

(*a.*) "Give the Committee your opinion of the results of your Experimental Farm upon the agricultural and stock-raising interests of Ontario?"

While it takes more time to evolve anything in farm cropping than in live stock development, this farm, by its ordinary practice, as well as through purely scientific research, has already done considerable for the country. In practice, it has introduced and distributed several new cereals that have stood their time fairly well. And the value of this subject is now more evidenced than it ever has been, by the fact that, with no wheat, oats or barley on hand to recommend, the very numerous applications for them are causing disappointment. So strong has this feeling become that I have just forwarded a recommendation to the Ontario Legislature, of which the following is an extract:—

"Ontario may have to take a second place in the extensive and cheap productions of cereals, because the possession of the country westwards being in some respects a repetition of our own life, will produce cheaper and maintain plant excellence better than older lands can do. This new feature of our Dominion agriculture must be acknowledged in Ontario practice, and that practice made to tie with it. This position does not imply that Ontario must give up her wheat area or that, the proper maintenance of varieties must be abandoned. I think, on the contrary, that it devolves upon us more than ever to give attention to these. Under the increasing fertility of our older lands, by the better system of farming and larger number of live stock kept per acre, Ontario is as able as ever to grow perfect wheat—both winter and spring varieties. The fine old Soule and Fife have left us meantime—not for want of proper norishment in climate or soil, but simply because in the regular course of their day, as cultivated plants, they require a change. We did not allow them that thorough recuperation by change to other climates and soils which alone affords new life, and hence serious disappointments and loss, that are too often ingnorantly charged to other causes. It comes as an interesting point in these considerations whether our North-West Territories will send us back the Fife, Club and white Russian, so reinvigorated as to give another lease of a quarter of a century. Meantime something else must be done."

"It is considered to be the duty of the Legislature in connection with this experimental station, to maintain a system of grain testing for ourselves as well as others. I am of opinion that Ontario, by all her physical conditions, is better adapted for this purpose than any other position on the American continent. European and United States experience say that the change of seed most suitable for them and us is from Southern Russia and Hungary, which have a climate in more respects resembling Canada than any other country. The isothermal of 45° joins Ontario and the Black Sea district, which is still so famous for sound wheats.

"A good deal has been attempted during the last ten years in introducing new wheats from the United States, both by private enterprise and this Experimental Farm, but, with few exceptions, they have failed, or were but short lived. This was a natural consequence of bringing from the south to the north. The work must be accomplished through equal, or more severe climatic conditions, than the country proposed to be benefitted, so that further attempts from the United States may be looked upon as fruitless. We should at once begin the purchase of wheat from Europe, not only for experimental testing here but immediate distribution throughout the Province. For this purpose I ask that $3,000 be placed in the Estimates for 1884, and that means may be taken for a proper selection by a competent person, so that the fall of 1884 and spring of 1885 may be fully provided for in chosen parts of the Province."

From this your Committee will realize how much importance is still attached to the proper maintenance of cereals. Then again, this station has very prominently drawn the attention of farmers to the importance of permanent pastures, and by a careful series of trials has now shown what varieties of grasses and clover are best for the purpose. The result is that very many in other Provinces as well as Ontario, have followed our directions with a most gratifying success. The success has been such as to call forth high commendations at public meetings, and a Senator of the Dominion lately said to the writer, that what the Ontario Experimental Farm had done in this respect goes a long way to cover all its expenses.

So also in regard to green fooder as aids to pasture, and special lines of feeding, this farm has very distinctly shown what can be done by the average farmer. In the case alone, of the clover called Lucerne, we have many followers who are much satisfied with the results. These, among others, are evidence of what we have done in farm cropping.

In more pure experimental work our record has been, as yet, introductory and questioning—the inevitable of all experimental stations with a nine years' history only.

The great question of the times, in Europe especially, is the value of special fertilizers. To this we have devoted more than ordinary attenion. The future may show something that is at present undeveloped in our experience, but meantime I take the position that the light thrown on our practical tests in the use of apatite, gypsum, and others, in the production of farm crops, goes to establish what might be matter of gratification to the country—that its wonderfully fertile climate, in conjunction with system and the best management and use of farm yard manure, renders the extensive use of special fertilizers comparatively valueless. I am aware that such an opinion will be challenged, and many cases cited in contrary proof, but in this, as in other things, marked exceptions are not wanting.

In making prominent the stock raising interests of the country our farm has not only done more than among crops and manures, but has actually held the lively interest of the United States, Australia, and Europe, during the last eight years. This has resulted from:—

1. Introducing new breeds of cattle not previously known in the Province.
2. In feeding and fattening their crosses with the common cattle, upon sound scientific and practical basis.
3. In pointing out their special properties and adaptability to particular objects.
4. In so breeding and feeding the pure breeds for sale as to command the confidence of the people.

As the agent of the Ontario Government in this work, I have been highly gratified at the success, and the response thus furnished is but a touch of the immense field open to the Dominion. As part of the same, we have been making careful experimental tests as to the value of many forms of feeding materials, not only with those at home, but others from Europe and the States, so that to date we hold some facts of practical importance in connection with the maintenance of animal life, particularly during our very distinct winters.

I beg your acceptance of the two following tables, which show the place we give to the most prominent breeds of cattle and sheep:—

## STANDING of Leading Breeds of Cattle as recognized in 1884.

| STANDARD POINTS OF CATTLE. | BEEF. | | | | | BEEF AND MILK. | | | MILK. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maximum Value. | Short Horn. | Hereford. | Aberdeen Poll. | Galloway. | Maximum Value. | Devon. | Norfolk and Suffolk Polls | Maximum Value. | Dutch. | Ayrshire. | Jersey. |
| 1. Early Maturity | 200 | 200 | 180 | 195 | 125 | 140 | 130 | 140 | 75 | 75 | 60 | 55 |
| 2. Permanency of Character | 100 | 80 | 90 | 68 | 100 | 85 | 85 | 70 | 70 | 63 | 65 | 70 |
| 3. Weight of Flesh | 150 | 150 | 134 | 143 | 110 | 100 | 85 | 100 | 70 | 70 | 50 | 35 |
| 4. Constitution | 50 | 40 | 50 | 36 | 46 | 50 | 45 | 50 | 50 | 50 | 43 | 30 |
| 5. Freedom from Disease | 60 | 50 | 60 | 48 | 57 | 60 | 60 | 55 | 60 | 60 | 50 | 57 |
| 6. Impressive Power | 40 | 40 | 35 | 35 | 33 | 40 | 40 | 25 | 40 | 40 | 33 | 35 |
| 7. Reliable Breeder | 60 | 48 | 60 | 50 | 58 | 60 | 60 | 54 | 60 | 60 | 55 | 56 |
| 8. Hardiness | 60 | 40 | 55 | 45 | 60 | 55 | 55 | 48 | 50 | 45 | 50 | 30 |
| 9. Quality of Flesh | 30 | 18 | 22 | 24 | 30 | 25 | 20 | 25 | 20 | 13 | 20 | 18 |
| 10. Forager | 40 | 27 | 37 | 30 | 40 | 40 | 40 | 37 | 40 | 34 | 40 | 27 |
| 11. Disposition | 35 | 35 | 28 | 33 | 24 | 50 | 50 | 38 | 60 | 55 | 48 | 60 |
| 12. Good Mothers | 25 | 20 | 25 | 21 | 23 | 25 | 25 | 20 | 25 | 23 | 19 | 25 |
| 13. Least Offal | 20 | 17 | 20 | 18 | 20 | 15 | 13 | 15 | 10 | 10 | 9 | 8 |
| 14. Quantity of Milk | 60 | 60 | 55 | 53 | 50 | 130 | 110 | 130 | 200 | 200 | 185 | 100 |
| 15. Quality of Milk | 25 | 25 | 20 | 22 | 20 | 65 | 65 | 50 | 100 | 50 | 30 | 100 |
| 16. Cost of Production | 45 | 42 | 45 | 44 | 36 | 40 | 35 | 40 | 40 | 40 | 35 | 28 |
| 17. Long Use | ........ | ...... | ...... | ...... | ..... | 20 | 20 | 17 | 30 | 30 | 25 | 20 |
| | 1,000 | 892 | 916 | 865 | 832 | 1,000 | 938 | 914 | 1,000 | 918 | 817 | 754 |
| | | | | | | Subject to explanation. | | | | | | |

(*b.*) "Do you consider that like beneficial results would follow to Canada as a whole, from the establishment of a farm by the Dominion Government?"

I do not; the Provinces separately are so much more directly interested, and able enough, both in means and enterprise, and can so much better give immediate superintendence as to set aside the help of the Dominion Government." But while actual special example is, in my opinion, unnecessary in this respect, precept and help otherwise would well become the parental position of Ottawa. This could take the form of:—

1. Collection and distribution of experimental work in other parts of the world;
2. Donations of seeds, manures, trees, books and kindred things to Provincial experimental stations.
3. Suggestions as to the direction of any particular line of enquiry at these stations.
4. And particularly the granting of lands or money for purposes of endowment of provincial institutions.

The three first will be referred to in subsequent notes; but here I beg very earnestly to impress upon your Committee the great power in the hands of the Dominion Government, from the possession of immense tracts of unsettled lands that could so appropriately be granted to agricultural colleges and experimental farms, in order to place them in permanent independence. I can conceive of no more appropriate application of the soil of the nation.

(*c.*) "What, in your opinion are the disadvantages under which our farmers labour, with respect to stock-feeding and raising, sheep-farming, production of butter and cheese, and the proper use of fertilizers, and in what way could an Agricultural Bureau, sustained by the Dominion Government, help to remove those disadvantages?"

### STANDING OF
# LEADING BREEDS OF SHEEP
### AS RECOGNISED IN 1884.

| STANDARD POINTS OF SHEEP. | Maximum Value. | Lincoln. | Cotswold. | Leicester. | Cheviot. | Oxford Down. | Hampshire Down. | Shropshire Down. | South Down. | Merino. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Early maturity ....... ...... | 200 | 150 | 140 | 200 | 100 | 180 | 170 | 170 | 180 | 70 | ........ |
| 2. Weight of Fleece.... ...... | 150 | 150 | 140 | 130 | 60 | 135 | 130 | 125 | 80 | 100 | ........ |
| 3. Permanency of Character... | 80 | 40 | 50 | 35 | 70 | 30 | 60 | 55 | 75 | 80 | ........ |
| 4. Quality of Wool........... | 70 | 40 | 37 | 48 | 30 | 50 | 60 | 58 | 65 | 70 | ........ |
| 5. Weight of Flesh ......... | 50 | 50 | 45 | 40 | 38 | 38 | 35 | 33 | 25 | 20 | ........ |
| 6. Constitution ...... ......... | 50 | 25 | 40 | 40 | 33 | 45 | 35 | 30 | 50 | 20 | ........ |
| 7. Freedom from Disease...... | 50 | 33 | 33 | 20 | 35 | 30 | 45 | 40 | 50 | 25 | ........ |
| 8. Impressive Power ......... | 40 | 20 | 25 | 35 | 25 | 15 | 30 | 27 | 40 | 33 | ........ |
| 9. Reliable Breeder...... .... | 40 | 23 | 25 | 20 | 30 | 40 | 35 | 35 | 38 | 15 | ........ |
| 10. Hardiness ...... ........... | 40 | 20 | 30 | 15 | 38 | 30 | 35 | 35 | 40 | 25 | ........ |
| 11. Quality of Flesh........... | 30 | 15 | 18 | 12 | 25 | 22 | 28 | 28 | 30 | 10 | ........ |
| 12. Prolificness ................ | 30 | 18 | 20 | 15 | 15 | 30 | 25 | 25 | 28 | 10 | ........ |
| 13. Forager.... ................. | 30 | 15 | 18 | 10 | 30 | 20 | 23 | 23 | 25 | 25 | ........ |
| 14. Disposition. .............. | 20 | 12 | 10 | 18 | 8 | 20 | 15 | 15 | 13 | 7 | ........ |
| 15. Good Mothers............. | 20 | 12 | 12 | 7 | 10 | 18 | 15 | 15 | 20 | 7 | ........ |
| 16. Least Offal.............. | 20 | 7 | 9 | 20 | 8 | 12 | 15 | 15 | 10 | 8 | ........ |
| 17. Length of Wool...... .... | 20 | 7 | 8 | 10 | 10 | 12 | 15 | 15 | 18 | 20 | ........ |
| 18. Uniform Fleece. ......... | 40 | 30 | 28 | 20 | 20 | 25 | 35 | 33 | 35 | 40 | ........ |
| 19. Cost of Production......... | 20 | 7 | 10 | 20 | 10 | 18 | 15 | 15 | 15 | 12 | ........ |
| | 1,000 | 674 | 698 | 715 | 585 | 770 | 821 | 792 | 837 | 597 | |

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This is a wide question and could well command a treatise for itself. It has four parts; those very briefly:—

The stock-raising and feeding disadvantages are, want of better pasture—such permanent pasture as the Ontario Experimental Farm has shown can be so easily established and maintained—able to keep one and one-fourth cattle beast per acre in place of three acres of the present stamp being required for one animal.

Want of better tree shelter.

Want of more pure-bred males.

Want of knowledge of adaptability of breeds to particular conditions throughout the Dominion.

I am so satisfied of the adaptability of parts of our Dominion to the production of mutton and wool on the large and cheap scale—in the North-West Territories and Eastern Provinces—that in December last I made a specialty of the subject in an address at St. John's, N.B.

The butter industry of Quebec and the cheese industry of Ontario, as recognised by their respective Governments, are no doubt well known to you, and I opine that in these as in the case of experimental farms referred to, direct Dominion help is not necessary. The disadvantages in the production are obviously want of strict scientific and practical details of manipulation; nothing else, because all our rural economy clearly indicates the permission of a large proportion of its area to such products.

I have elsewhere submitted my opinion as to the use of fertilizers. Let me add further, that as a progressive nation we must keep a strict eye to their future—especially in connection with the increasing area of permanent pasture and very possibly the demand for their use in the top-dressing and the improvement of much of the great ranches of the North-West.

An Agricultural Bureau, I think, could not meet these disadvantages practically. It would help by monthly issues, keeping farmers informed as to markets, quantities on hand, and kindred information, which, after all, are not unknown to the keen man of business. However, in this line, I have to say something in another place.

(*d.*) "Do you think the importation and distribution of seeds, plants and scions would be beneficial, and would it be necessary that these be first tested on an experimental farm before distribution?"

I am of opinion that under this question we have the most important indication of what the Dominion Government should do for the agriculture of the country. The subject is tree culture.

Nothing has such a Dominion significance as this. It is, of all things, in our present rural economy, the biggest want, the unseen danger of the Dominion. It is not, in its widest sense, a personal duty, nor a sectional interest, nor even a provincial one. The scientific and practical bearings of arboriculture embraces the whole sweep of a country, however extensive, because it is not alone the roadside shade tree, the belt of timber, the special clump or the sectional plantation that is wanted. The amelioration of our climate by tree surface, and the extensive economical cropping of them, is clearly a thing of the Dominion Government.

I presume it is unnecessary to elaborate on the importance of conserving parts of the present forest lands, or to show that re-planting is absolutely necessary in other parts, and assuming that your Committee would rather confine its advice to what is more directly under Dominion control, I presume there is field enough in the great North-West for the exposition of practical arboriculture.

My experience as a British forester from 1850 to 1871, in draining and enclosing forest lands, rearing trees from seeds, and planting over 15,000,000 of them, and also having had to assist in establishing the claims of arboriculture as a science in connection with the British Association for the Advancement of Science, all go for nothing if I do not see that our magnificent West will never hold the grannary, nor the flesh larder of the world, as it should, until it also becomes the source of wood revenue by annual thinnings. It can be done. It would not be difficult to do. What to do, permit me to indicate by a list of subject headings:—

1. The establishment of two or more stations as nurseries throughout the North-West, with houses for laborers and foremen, and enclosures suitable for production of trees, both from seed and by purchase.

2. The careful testing of varieties of trees native and foreign to Canada.

3. The gradual and systematic choice of positions for plantations, their fencing, and such cultivation, preparatory to tree planting, as may be deemed necessary.

4. The immediate recording, by Statute of the Dominion, of power by Government to resume any part of land leased or sold, or to be leased or sold, for purposes of tree planting.

5. The gift of trees to settlers, upon conditions.

6. The annual planting and care of the trees upon the best known principles of science and practice.

7. The appointment of a Forest Conservator—directly responsible to Government.

Examples are not wanting to build upon in all these—in Europe, India and Australia. In Australia one of my brothers is conservator, and his seven years' work, to date, has produced results surprising and most gratifying. Why should Canada hesitate. Are we waiting to know that, independently of climatic influences, there is actually more annual revenue to be derived from a tree crop, under good management, than by any other form of produce whatsoever.

(*e.*) "Would the collection and distribution, of agricultural information and statistics be of advantage to farmers of the Dominion, and how would you advise as to both collection and distribution so as to ensure the maximum of reliability and benefit?"

Most certainly. The Dominion, I think, should act as a centre for all the Provinces receiving their statistics, analysing them and distributing according to relative importance. Provinces should best manage their own agricultural materials, but their distribution by the Dominion would tell better in the eye of the world, would give every Province a better status, as being Canadian, less partial and presumably more reliable.

(*f.*) "What do you think of the advisability of appointing an expert analyst of soils and fertilizers, to whom samples could be sent, and from whom exact information as to quality and utility could be had?"

I think we are not yet ripe for this. Its consideration may well be taken up about the year 1900. We have pioneering, reclamation, reafforesting, and a settled agricultural economy to do, that will demand our full efforts, without the exact scientific helps indicated, and which belongs to an older state of things than Canada yet possesses.

(*g*) "What could be done in the matter of the collection and publishing of valuable information in handbooks and treatises?"

There is more practical and important to the farmer and country generally than the previous question. Governments in new countries ought to be teachers, and one of the best forms of reaching the older members of the community is by printed matter. I can conceive of no better way of expending $10,000 annually than by the employment of one expert, who, quarterly at least, would submit such choice agricultural literature in pamphlet form, not too massive, as would command the confidence of our farmers. I would not advise its free destribution, but at a charge of say 25 cents per copy.

(*h.*) "Has the publication of the Report of the Agricultural Commission of Ontario proved beneficial to the farming and producing interests of that Province?"

To a very large extent indeed, and this is evidence enough, for the prosecution of the previous question. Not only has their agricultural report disseminated knowledge of direct practical value, but it has given the Province a status in the eye of the world that is already doing a great good. Now, I am of opinion that were the Government to issue annually a succinct, well arranged and readable report on the whole industries of the Dominion, the effect would be full. It would have to be crisp, semi-entertaining, partly historical, up to time, and smart in its issue.

Allow me to ask the question, if your Government is now preparing such a digest in view of the visit of the British Association for the advancement of science, which, as you may be aware embraces in its own enquiries—statistics, mechanics, geography, physiology, zoology, botany, geology, chemistry, physics, mathematics, arboriculture and agriculture? If not, we will surely be found wanting.

(i.) "What measures could be adopted by the Dominion Government to secure an improvement in the raising of stock?"

This is not easily answered because of its great importance, and of the great field covered. As a people, we live on flour, flesh and fruit, and if flesh be second to flour in importance, it is now, at any rate in the older Provinces, the back-bone of flour. What can we do to make our farmers realize the difference between breeds—between pure breeds and grades—and that Canada all over is a splendid field for their most perfect and economical development. The subject has two aspects: the production of thoroughbreds for ourselves and the American market, and of grades partly for ourselves and largely for the British market. I may be too warm on these to give what may be called an impartial opinion, for I have always contended that as Canadians we have not yet realized how much we can do as a country in these particulars.

No part of the American continent can compete with us in the healthy maintenance of cattle and sheep, and were our farmers alive at the present moment to what is going on in the United States as preparatory to an almost universal bonanza in beef and mutton, they would surely waken up—for I do not think we want for enterprise—once realized. I see no reason why Canada should not place and hold herself as the sole breeding ground for the United States. The Americans themselves think so. They act upon this belief and yet we do not seem to see it.

I beg your indulgence for those remarks, for I feel more upon this weakness of our business than anything else. What can be done?

I think your Government can help very materially.

1. Good as our quarantine has been, I would advise the appointment of an efficient officer at Liverpool, with power to admit no animal on board ship destined for Canada, that has the slightest symptom of any infectious or contagious disease. He could easily overtake the like duty at other British ports.

2. I would establish, under the Commission of Agriculture at Ottawa, a branch office, where every breeder of pure, bred cattle, sheep, horses and swine throughout the Dominion, would be invited to register their name, address and classes of animals on hand annually, in order that those in search of stock might readily, and at no expense, obtain information.

3. The Government should institute an extensive and systematic series of prizes for the best managed herds and flocks, the conditions to be of the most strict, far-reaching, and yet easily admissable sort. Reports upon the same to be included in question (*q*).

I have the honor to be, Gentlemen, your obedient servant,

WM. BROWN.

## Estimate of Annual Maintenance of an Agricultural College and Experimental Farm.

### THE AGRICULTURAL COLLEGE.

| Cr. | | | | | Dr. |
|---|---|---|---|---|---|
| | $ | $ | | $ | $ |
| Fees of 100 students | 5,000 | | Salaries of five teachers | 6,000 | |
| Students' board charge | 7,500 | | Management of College | 1,700 | |
| | | 12,500 | Boarding house management | 1,900 | |
| Balance to debit | | 10,600 | Boarding house expenses | 10,500 | |
| | | | General repairs | 3,000 | |
| | | 23,100 | | | 23,100 |

### THE EXPERIMENTAL FARM.

(400 Acres cultivated.)

| | $ | $ | | $ | $ |
|---|---|---|---|---|---|
| Revenue from sale of Live Stock, Wool, Grain, &c., &c. | | 4,700 | Salaries of three Foremen Teachers | 2,100 | |
| Balance to debit | | 2,640 | Wages of four Ploughmen | 1,440 | |
| | | | Wages of Cattleman and Shepherd | 800 | |
| | | | | 4,340 | |
| | | | Special Manures, Seeds, Blacksmith, Harness, Medicine, Fuel, Printing, Implement repairs, &c., &c. | 3,000 | |
| | | 7,340 | | | 7,340 |

WM. BROWN.

MONTREAL, 11th March, 1884.

DEAR SIR,—We would like to add to the remarks we have made on your printed form, that there is a general deficiency in the manufacture of cheese in the Province of Quebec, and in some parts of Ontario, but this is traceable to the rapidity of the growth of the manufacture and, no doubt, as the makers get more experienced they will make better quality and as the farmers grow wealthy they will be willing to put up better buildings and pay better prices for everything that is used about the factory. The matter requiring immediate and urgent attention is that of better boxes. We do not think the Government is aware of the importance of the manufacture of cheese. We were pleased to note the remarks of Mr. Arnold before your honorable Committee the other day, but Mr. Arnold has by no means stated the whole facts of the case. The total exports of cheese for the last six years from Canada have gone on increasing with wonderful rapidity, until during 1883 over 1,000,000 boxes of cheese, amounting to about $7,500,000, besides nearly $2,000,000 worth of butter, has been sent out of the country. The peculiar situation of Canada, in this cool climate, puts us in the same position as Denmark and Sweden, and leaves it without question that there is no place in the world that can rival us in the production of both butter and cheese. If the Government desires to foster the larger make and better quality of cheese, we would respectfully suggest that it can best be done by employing skilled, practical makers of cheese, to go about the country among the factories giving them instructions; this has been done to some extent in Ontario with commendable results, but we think a considerable improvement can be made on the system there, and, with no disrespect to Prof. Arnold and men in similar positions, our experience of some twenty years (and permit us to add, that during that time we have been by far the largest exporters of butter and cheese from Canada, and perhaps from this continent) has led us to believe in the instructions of good practical makers, who have a well-known reputation, and are always successful in making the finest cheese. We feel positively certain that three men in Ontario, and three men in the Province of Quebec, employed at a salary not to exceed $1,000 per annum including all travelling expenses (we mean, each person to pay his own expenses out of the $1,000) would result in a value of $50,000 to $100,000 to the country, and possibly twice this amount. If it was thought best we would submit to you a plan of work for this season: lay out the Province of Quebec in sections for each man, and we think we could suggest men who would give unbounded satisfaction, both to the Government and to the factories; for the Province of Ontario, the Dairymen's Association have already this matter in good control.

*Butter.*—The manufacture of butterine and oleomargerine in the United States has caused an almost entire cessation of demand for the ordinary grades of butter, or for over-kept and stale lots. It is therefore altogether likely that the store-packing of butter, so prevalent in many parts of Ontario, will almost entirely cease, simply because there will be no demand for it. We see no way to stop the large losses that will occur to merchants and farmers during the probable transition of the making of the butter by the farmers, to its being made in factories, after the present system that cheese is made on. There are a few creameries in Canada at the present time, but these few are going through the same experience that the manufacture of cheese did about twenty years ago, and until more factories are established and the make becomes very much larger, the profits will be, comparatively speaking, smaller than could be desired. For the above reasons the butter problem in this country is a much more difficult one than that of cheese. We would suggest that if the Government desires to foster the building of butter factories or creameries, that it do so by giving a bonus of a certain sum of money, say $1,000 to each factory, which shall be established under fixed regulations; for the present, this might be limited to one factory in each county, and not more than one-third to one-fourth of the counties in Ontario and Quebec are butter-making counties. Say that the building shall be of a certain style of construction, furnished satisfactorily; that it must run for a certain number of years, with a certain number of cows; that the maker must receive a certificate from a Committee qualified and appointed to examine, &c., &c.

We hope we have made ourselves plain in the above, and shall be glad to answer any further questions you may choose to ask us.

We remain, yours respectfully,

A. A. AYER & CO.

G. A. GIGAULT, Esq., M.P.,
Chairman, Committee on Agricultural Industries,
House of Commons, Ottawa.

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LANCASTER, CANADA, 18th March, 1884.

DEAR SIR,—I herewith enclose your statement filled out to the best of my ability. Had I more time to deliberate on the different questions I might answer them more fully, but this being my busiest season, I hope you will overlook any omissions I may have made, and I will always be pleased to give any information that lies in my power to further the industries and welfare of our country, and especially in the agricultural and dairy line,

Yours truly,

D. G. McBEAN,

G. A GIGAULT, Esq., M.P.,
Chairman, Committee on Agricultural Industries,
House of Commons, Ottawa.

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1. The greatest difficulty the farmer labours under is exhausted land and a lack of knowledge of the relative value of manures and the proper means to obtain the best fertilizers, pure. 2. Wheat is a failure; oats, barley and other grains, good crop. (2.) Not much roots grown; grass, good crop. (3.) Want of improved male animals. (4.) Low average of milk per cow. (5.) Culture of fruit, none worth mentioning in this section (6.) Barnyard manure losing its main strength by being exposed to leaching rains; some land plaster. 3. Very much if they can be relied on. 4. Yes, if a satisfactory system could be adopted. 5. Think it would. 6. Very great. 7. Very advisable. 8. Sometimes crows and black birds are troublesome in spring and fall, but not much to speak of. 9. Wheat, from fly. 10. None. 11. No details. 12. None. 13. I think it would. 14. Consider the present quarantine to severe; it prevents many persons importing improved cattle for breeding purposes. Would suggest the present system be much modified and changed, as no person would import any animals infected and run the risk of loss to themselves and others. The present system is too expensive and too few stations for quarantine. 15. Quite sufficient. 16. None. 17. None. 18. The establishment of a Central Bureau would be a very valuable and useful establishment, and would tend to further the interests of farmers very much. 19. This is a much needed reform, and should be very beneficial. 20. Would strongly recommend that accurate statistics be obtained on above points. 21. Yes; I think it would, and be very valuable, and would repay their publication. 22. No answer.

D. G. McBEAN,
*Cheese Manufacturer, Lancaster, Glengary, Ont.*

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*(Translation.)* ST. ISIDORE, Co. LAPRAIRIE, 29th February, 1884.

DEAR SIR,—I was gratified to learn of the appointment of a Committee for the purpose of promoting the advancement of agriculture and to enquire as to the importance and expediency of establishing a Bureau of Agricultural Statistics, such as that existing at Washington and in other countries. The idea is an excellent one, that of assisting agriculture, which has been so despised, ignored and neglected. I congratulate you, for you have undertaken the healing of one of the most inveterate evils of our country:—routine; yes, routine has done us a vast amount of harm and we must strive to shake it off. The appointment of your Committee is a step in the right direction.

I am unfortunate in not having received your questions sooner. They cover too vast a field and are of too much importance to be answered lightly and hastily, and I shall take the liberty of answering, first, those which appear to me to be more easily solved. In this way I can prepare myself for the others and accomplish my task with less difficulty.

I returned home only on Thursday and went to work at once energetically. I soon found the undertaking to be a serious one, however, and you need not expect me to tell you anything very new; for I have no time to consult friends or books which would, no doubt, be of great assistance to me in many ways.

After this preamble, I must ask you to excuse the form of my reply, and to look upon me as one who is most anxious to convince your Committee that it is highly important and expedient to establish a Board of Agricultural Statistics, and that it is high time to place the most important of all subjects for our country at the top of the list of subjects for study, and under the high patronage of the General Government.

Your, &c.,

N. PREVOST, M.D.

P.S.—I shall send you my answers as I shall have finished them, and give the numbers at head of each answer.

1. The deficiencies of our system of agriculture are many, and are visible in every branch of culture and on every farm. The chief difficulties arise from the fact that our farmers are left to their own light and resources. Private individuals must make all experiments, run all risks, take the lead and often work at a loss for want of experience and direction. Having no scientific knowledge, they have to struggle on in the dark; they sow without discernment in soil which may or may not be suitable for the seed committed to it. The result, in many cases, is a failure of the crop, loss and discouragement. How much money is lost in this way by the wealthy inhabitants of our cities, who attempt amateur farming and play the part of skilled agriculturists. They maintain that farming is an easy matter and the theory easily acquired, but if they attempt anything new in order to avoid routine methods, they become the victims of their own want of system. Ignorant of the producing power of their land and of what each germ needs in order that it may receive fecundity and nourishment, and reach maturity, they cannot supply the needs of the soil by fertilizers, or provide a remedy by a change of crop. Let us but have method and intelligence in our system of cultivation, and any soil whatever will return us a hundred fold. "The soil is less in fault than anything," says Lafontaine; "work it well, take pains, and you will find a treasure in it." In other countries the outlay for experiments, tests and new systems, is defrayed by the State. The fullest light is thrown upon the whole matter. Each farmer knows what his land is capable of growing in greatest abundance, and it very rarely happens that the farmer loses everything, even to the seed he has sown, as we often see in Canada. He cultivates products which he knows to be suited to the character of his land; he knows the deficiencies of the soil and the properties of fertilizers and can apply the latter where they are needed. Thus he seldom labors at a loss, and he is in a better position to bear up under a fall in prices. Moreover, being thoroughly informed as to the demand and as to prices, he is enabled to take advantage of all circumstances; he takes his measures beforehand, applies his energies to those branches which will probably pay best, and it is very seldom he fails to succeed in at least several of the products of his work. He enjoys many advantages over our Canadian farmer; his products are necessarily pure, of first

quality and presented to the consumer in the most attractive form. Everything is done by him with skill and knowledge, everywhere, and at all times. I remember that our apples were at one time highly thought of on the London market, but complaint was made that they were badly packed, and quite unpresentable. What is our stunted wheat, mixed with wild seeds, worth, as compared with the pure, plump grain grown in a suitable soil? It is admitted that we lose on nearly everything we sell. What profit do we make on pork, butter, beef, eggs or poultry? We sell them because we must have money. We grow wheat enough for the needs of the household and no more. We can derive profit from some two or three articles only, and if the crops of these products fail, we are forced to borrow money. This very often happens. Were our farmers better instructed in their art, if they grew a greater variety of crops, they would be in a safer position and their farms would not be exhausted by successive cropping. They would find the means, either by rotation or by the use of natural or artificial manures, of restoring to the soil what each crop must take from it. The material for the future crop must always be at hand and ready for the wants of nature. 2. This is the question I am most loath to answer, because I cannot avoid mention of certain details of very great importance. An examination of the subjects involved in this question is of the highest interest for your Committee and would convince you of the necessity of establishing a Board of Agriculture. Before beginning, I may say that I learn from my paper, *The Rural New Yorker*, that Congress has adopted, by a majority of 155 to 127, a Bill creating the "Bureau of Animal Industry," a sub-division of the Bureau of Agriculture, with a staff of twenty employés. In a subsequent answer I shall speak of the necessity of a like Bureau for Canada. The cultivation of cereals is seldom perfect in our older parishes. The same grain is sown too long in the same places. A change of field is made only when the soil will no longer produce. The seed grain is not clean enough and not renewed often enough. Crops are not sufficiently varied. The same cereals are always sown, to the exclusion of others which would pay better and yield better and not exhaust the soil so much. A different kind of grain should be sown every year, especially in our older lands. This rotation would be better suited to the state of our soil. Beans, Indian corn, rye, Lucern, buckwheat, flax, &c., are almost unknown crops in this district. Other varieties of wheat and oats should be substituted for our red wheat and common oats. White Russian wheat and oats would bring about an improvement. Barley and peas might also be varied with advantage. Weeds are also a great yearly drain on our crops. I shall not enumerate them: the list would be too long. The great remedy is repeated summer ploughing. This is done in France and in Belgium, and must soon be adopted by us. I know farms which are poisoned by weeds. The cultivation of vegetables and roots is also a good means. A stringent law is needed, compelling farmers to keep their land clear of this pest. Some persons go to excess as regards trenches; they should be dammed up in time of drought in order to preserve the summer rains. No sooner does a shower fall than these small drains hurry off the water to the ditches and the soil retains but a very slight layer of moisture. This is a great misfortune. In spring and fall and for all low lands these small drains are of great service. But when the soil has its natural drainage they are not needed. Fruit trees are not sufficiently selected: we cultivate too many of the wild species of the country, and the fruit has no value whatever on the market. We are entirely uninstructed in the matter. Except in the hands of city amateurs or gardeners, we have very few good orchards or fruit gardens. For our people, an apple tree is an apple tree, no matter what quality of fruit it yields, and they look for nothing more. The same is the case as regards plum trees. This is really deplorable, for these trees take the place of others which are highly profitable and valuable. 3. The importation of seed from other countries would be of great benefit to our farmers. Generally speaking, the introduction of new seed increases production. Grain which does well in foreign countries, with climates about the same as ours, will succeed well here, and would probably be a great improvement. Our successive crops of the same grain have exhausted the soil, and the number of crops included in our rotation is so small, that the same product recurs too often. We must introduce new branches of culture, or procure grain of a more vigorous type and less liable to fail. As an instance: I myself introduced white Russian wheat with white Russian oats in St. Isidore. The benefit has been immense, and at present both are widely diffused throughout several of the adjoining counties, and I have had applications even from the County of Shefford. In 1880 I was offered $3 a bushel for every bushel of wheat and oats I had to sell. These two kinds of grain are not liable to rust like the red wheat, and from the high prices asked and the prizes offered, they have always given a good crop.(?) Judging from the many new varieties of each kind of seed, I am inclined to think that the introduction of new seeds is a good thing, and that the seed merchants find therein a means of attracting purchasers and of making a good name for themselves. The Government might very well, for the encouragement of private enterprise, distribute new kinds of seed, especially to persons who apply therefor. This would be the way to hasten the introduction of highly desirable kinds of seed. Generally speaking, seeds of this kind are very dear for several years; but if by a judicious distribution, you show the excellence of such seeds and the profit to be derived from using them, no one will complain, particularly when it becomes evident that they must be a source of profit. This would be the means of increasing our production within a few years. A great deal of good would be done, especially, by the introduction of new and improved seed for the garden, and this would cost but little. Rye should be sown in many places, and it would pay better than barley and wheat. There is no better grain for general consumption on the farm. Our barley is capable of being greatly improved. Black oats, Fyfe wheat and Lucerne are not grown in sufficient quantity, particularly in my district. 5. Some ten years ago, the agent of a certain nurseryman came amongst us and, taking advantage of our ignorance, flooded us with worthless apple trees. Some individuals bought as many as a hundreed trees, which they planted and tended; but the trees have been found to be crabs of the worst kind and of no value whatever. We are cutting them down and substituting better trees. We ought to try and find fruit of different flavors. Abundant yield and keeping quality are the first things to be considered. It is better to keep to our native fruit when equally good in every other respect. I regret the scarcity of gooseberry plants; they yield abundantly, mature well and give a delicious fruit. We should give up growing pears; our climate is too severe. Some trials might be made of the hardiest and earliest varieties. A mere glance at our orchards shows that our treatment of fruit-trees is quite elementary. Every tree you meet is a proof of our apathy and of our ignorance in this branch of culture. And yet a more liberal use of fruit would largely exempt us from having recourse to medecine. The cultivation of roots is too little practiced. This is much needed for the improvement of our land and the destruction of weeds. The kinds chiefly grown are beet-root, potatoes, carrots and onions. In the parish of St. Philomène, county of Chateauguay, there is a little valley which produces onions in perfection; it is a pity they are not grown on a larger scale and more generally. Tobacco grows well in the Province of Quebec, particularly in the southern districts; one person told me he could raise 800 pounds to the arpent. We grow it in large quantities but of poor quality, and the latter fact is due rather to our inexperience than to the climate. We should make choice of the early kinds. Those which have been acclimated give a good leaf which dries well and makes a tobacco which for aroma and flavour is difficult to equal. After trying several kinds myself, I decided in favour of Canadian tobacco. I am now acclimating a variety from the island of Cuba. The leaves are very tender and easily torn by the wind. I succeeded in growing a few heads last year. The leaf ripens rather late, and some artificial heat is required in order to dry it in good shape. The grasses we grow are timothy and clover. They are good kinds but we ought to have others, especially for pastures. Some kinds do well on high lands, and others on low lands &c., &c. We allow our meadows to get too old, and they then give but a poor quality of hay, fit only for coarse stock fodder. The great fault of our farmers is that they allow their cattle to feed on the meadows, sometimes in spring, and always in the fall. The animals trample the ground until it is hard, tear up the sod, and leave the root of the grass too bare for the winter frosts. There is much to be learned as to the cultivation of grasses. It is quite certain that a judicious selection of forest trees, fruit and ornamental trees and fruit-bearing shrubs from Russia or other countries, would lead to a great improvement in the general products of our orchards and gardens. The most important point is to ascertain the average temperature of the country whence they come, between the flowering time and the period of maturity of the fruit. Once that is known and the number of days required, we cannot but succeed, other things being equal. No doubt Russia must be our chief source of improvement; but there are many other kinds which would, when acclimated, become hardier and bear ealier. There is a Russian plum which would certainly produce a vast improvement in that product alone. Happily, industry and trade are coming to our help; I see by the catalogues of the nursery-men and seed merchants, that many new plants are forthcoming. But much time is needed before things become well known, appreciated and above all put in practice! An amateur who would undertake to visit those countries would be of great service to us and would assist the nursery-men. In this industry there are many things to be considered. Improvement of species lies in a variety of flavor, productiveness and keeping-property of the fruit, hardiness of the plants, &c. The mode of cultivation and the harvesting and preservation of fruit are also susceptible of improvement. As regards forest trees, my advice is that our Consular Agent should take up his quarters for a few weeks with the State forest keeper, and then give us an account of what takes place under his very eyes. We shall then have a practical treatise on the culture and preservation of forests, which will be quite as valuable as the learned essays of theoretical savants. 3. No answer 4. The adoption of an inspection brand is most important in many ways. Our climate and natural advantages are such as to entitle our cheese and butter products to a high place in foreign markets. The conditions being the same, why should we not compete with Switzerland and Norway? At present our butter and cheese are sold under the general name of American produce. The name is rather too general, and must be injurious and a cause of great loss to us. A distinctive national inspection brand will soon make us known; our products will then have a position and a name. The inspection, being a guarantee, naturally inspires confidence in purchasers, and business is done more rapidly and to better advantage. Producers also find it to their advantage, particularly those who make a choice article. These are the producers we need. When the producer finds the article he makes recognized, sought after, and above all well paid for, he increases his production and works with a greater energy, thus increasing his own profit and the trade of the country. The establishment of inspection will be followed of necessity by the establishment of butter and cheese factories, for our farmers know well that this is the only sure means of making a good article. You are well aware that manufactures are the best stimulus for our rural population. They excite emulation between neighbours, each one striving to have most milk, the best cows and the best cared for. And see the effect of this spirit upon the whole country. Let us remember that Canada now produces an enormous quantity of these articles of food; the Census gives the figures at $6,000,000, and undoubtedly, the amount is now much greater. A meeting of cheese-men was held lately at St. Hyacinthe; a gentleman who was present at the meeting told me that the majority were in favour of Inspection and of a distinctive brand, particularly for articles exported. This would, he said, secure from 2 to 5 cents more for butter and 1 to 3 cents more for cheese. He said, moreover, that inspection brought about the production of a better quality of article, and that it is desirable, even as regards our home market.

6. A public analyst is very necessary, and I thought the Government had several of them employed. Such an officer, with competent assistants, would be of great service to the State in many ways, and under many circumstances. How can the law respecting the adulteration of food be enforced without an independent, competent person being appointed to discover and lay bare fraud? Nothing can be more easy than to put on the market and sell chemical manures, pulverized or otherwise, of a worthless character. The composition of these articles is unknown to us; the chemicals may be quite inert, or the article may possess but a minimum of the requisite fertilizing power, or be something quite different in its composition or its qualities. Moreover, by analyzing the soil, that officer would be in a position to direct us and enable us to select suitable and profitable fertilizers. He could show the advantage and necessity of certain fertilizers for certain soils and for certain crops. If I were about to plant an orchard, or any other fruit trees, or vines, or to grow a field of hops, would not an analyst render me great service if he were to say to me: "Your soil is not suitable; you are going to lose your money and your labour;" or, "Take such a fertilizer and such a product, that is what suits your land, and you will succeed?" How many mistakes and what a waste of money such an officer would prevent? These chemical manures are, you well know, entirely beyond our knowledge, as to their composition, properties and application. It would also be part of his task to inform merchants as to the requirements of the country in this matter. I, myself, have purchased, at a high price, Paris green, which proved to be a powder entirely inert. On applying it repeatedly, I succeeded in killing only one-half of the insects which were destroying my potatoes. Perhaps he will be able to tell us why, in certain sections of the country we are almost or quite unable to produce certain fruits, vegetables or cereals. An analyst can state the price or value of a piece of land for a given product; he can instruct the farmer and direct him as to the mode of working, preserving and applying our natural manures, and in this respect alone, he would be worth millions to the country. It is too bad to see our farms, which are so much in need of it, deprived of the return of the manure of which they furnish the chief part. N.B. The grasses which succeed timothy in our old meadows, are red top and others of that quality.

7. A Bureau of Agricultural Statistics cannot be complete and useful without the establishment of an experimental farm. It is very difficult to be practical in agricultural matters and teach no more than the theory. Before inducing the public to use a certain seed the Board must be sure that they are recommending something useful. The experimental farm must be conducted by men of instruction and specially devoted to and having a love for the art of agriculture. They must make many trials and comparisons of systems of culture. Chemical fertilizers and seeds must be studied. Foreign fruit trees must be planted in order to study their growth and report thereon, so that it may be ascertained whether they would be useful to the country. It is also good to make comparisons between different seeds of the same family in order to know the best. They can then be recommended with confidence. The Board should also examine the products of other countries and try on the experimental farm to apply the means of production, in order to introduce them into the country. New and improved implements should also be an object of study. By means of comparison we should find out the most use-

ful. The scope of experiment must include the study of stock and their products: animals of various races; experiments in feeding, with comparative tables showing increase of weight. The farm should have a well stocked poultry yard. The latter would do an immensity of good simply by showing the country people how to take good care of their poultry; it is a great source of profit. Bee raising will also be carried on and is calculated to form a most important subject of study. I consider an experimental farm to be the surest and most expeditious means of putting into practice all that the Board can effect for agriculture. Let us preach by example, let us put our precepts into practice ourselves. This experimental farm must necessarily be carried on by the labor of a certain number of young men; this will train up so many farmers fitted to do good to their fellow citizens and to diffuse a knowledge of skilful farming. An experimental farm is an absolute necessity. The Government might establish a number of them. Close by this place they would find a piece of land which is almost virgin soil, at Sault St. Louis, or Caughnawaga. This would be of benefit to the Indians; for by dint of seeing a good system of cultivation in operation, they would probably learn something of the art themselves. I am in favor of an experimental farm. (8.) Birds do very little harm to crops in this district. When I first came to St. Isidore very little wheat was sown, rust and the Wheat, or Hessian, fly being the ostensible cause. In my opinion exhaustion of the soil was the most efficient cause. The Colorado beetle has certainly reduced the potato crop by one-third. We can no longer raise currants, gooseberries or cabbages and only very few onions. We lost a whole crop of buckwheat in 1880, destroyed after flowering by an invasion of green lice. The same thing happened in 1881, but as the lice came a little later, the grain had filled and we had about half a crop. The wheat crop has been reduced by rust the last two years—in 1882 three-fourths, and in 1883 one-half; oats, in 1883, one-fourth; peas, in 1883, three-fourths. Smut is also doing much harm to wheat, oats and Indian corn. And yet it would be easy to diminish this evil, though very few persons know the remedy. The pastures very often are not seeded with grass, and all that grows in them is what chance or the wind scatters over them, more weeds than good grass. Our stock are generally of an inferior breed, too small and too pot-bellied. Our Canadian cow is evidently of a handsome and noble breed. We still meet with very fine samples of the race; but we have taken so little care of the stock that the breed has greatly degenerated. If we are fortunate enough to have a good milker in our flock, she is the first we sell; because we must get money. It would be much better to sell all the others and keep the only one which can pay. It is evident that we must raise cows; our soil is over exhausted, and it is the only means of restoring to our farms their primitive fertility. We ought to cross the best specimens of our native breed with the Jerseys and Herefords, especially in those districts where dairy products take the lead. Devons, Durhams and Polled Angus are more profitable for the production of beef, and will be better suited for the prairies of the North-West. Our breed of sheep are pretty good for the market, but the wool can only be sold for the manufacture of blankets. The introduction of Southdowns or Merinoes would be a great improvement and would be no diminution whatever of the value of the meat. I think it is better to have more milch cows to improve our land and for the profit resulting from the raising of stock. We should keep only sufficient sheep for the requirements of the family. Our breed of horses is every thing that it should be; it is suitable to our wants, and our horses sell well when there is a surplus. We should improve our stock of cows and increase their number, and remain as we are as to horses. We must adopt the factory system as regards dairy products. It is the way to produce a first-class article and to secure high prices and quick sales. If we had an agent at Liverpool or London to sell these articles, it would be a benefit of all parties. The study of natural and chemical fertilizers is highly important; it is, so to speak, our plank of safety. It would take me a long time to tell you all we lose by not treating our manures properly. By properly handling our manures we can do without chemical fertilizers and improve our farms by raising stock. The study or practical knowledge of fertilizers and of their application to different crops is highly important. The mode of treating manure is a matter of great importance; the ammonia it contains should not be wasted by over-heating and the other soluble salts it holds and which form its most valuable constituents should not be allowed to be washed away by the rain. We throw away our ashes and allow our hen manure to accumulate in the hencoops, and yet no chemical fertilizer can equal them for the garden, &c. I have often been moved to anger at witnessing the mistakes made by our farmers in their mode of dealing with manure, and the loss occasioned thereby. 13. The appointment of an entomologist would be very useful to us. He would instruct us in the best mode of dealing with insects injurious to vegetation and to the growth and maturing of fruit. In the use of Paris green alone there is enough to show the necessity of such an officer. Paris green is nearly always used mixed with plaster, and yet the water system is far better. The expense of the plaster is saved. Water costs nothing, diffuses the agent better and is more easily applied. Using Paris green to excess injures the plants and diminishes the yield of the crop. Let us now calculate what the country loses merely by the use of this insecticide, and it will be evident that we shall gain greatly by paying a good salary to an entomologist capable of instructing the public, through the press, and by means of his reports. I know a person who told me he had paid a dollar to a gardener for his recipe for destroying the cabbage worm. If that recipe were better known we might raise cabbages as we did before. I see that the Minister of Finance counts on having a surplus of a million; now, why not vote a few thousand dollars for this purpose, and thus increase the produce of the soil and the wealth of the country? All that we need is a little good will. 14. The raising of stock is what will render Canada a fertile country, and independent of any other nation, as regards the product of the soil. Our future prosperity depends on it, and the sooner we begin to apply ourselves and the greater the amount of intelligent care we devote to farm stock, the sooner we shall attain a fair average as regards our crops. We find that, in the older States of the Union, horned cattle are much more largely raised. The land, exhausted by continued cropping, will again recover its fertility. The members of the American Congress have shown that they are keenly alive to the necessity for such a Board, and passed a most liberal law for the protection of their cattle. We must protect our stock against bad treatment during transport, and against the contagion of the terrible diseases which decimate the cattle in certain foreign countries. England, our wealthiest and most important customer, has adopted, and is now adopting, most stringent regulations, in relation to the cattle trade. She has, long ago, put an embargo on cattle from the United States, and we had a narrow escape from being subjected to that severe measure. Woe to us should we ship a herd with the slightest trace of disease, for the English market would at once be lost to us. When we import cattle from foreign countries we must keep them longer in quarantine, and let them pass only after a strict and minute examination. Recently an outbreak of the foot and mouth disease occurred at Dering, in Maine. It was caused by some cattle discharged after quarantine, which infected the herds along the way as they proceeded to the West. We should have as few ports of entry as possible, and it would be well to have a good veterinary surgeon there to inspect the cattle as they arrive, or on their leaving quarantine to enter the country. In short, we must imitate the Americans and establish a Bureau. They are eminently practical as to the raising of stock. Their products are now to be found on all the markets of the world, competing with those of every other country. I need not give you any further statistics, but simply quote the following evidence given before the Committee of Congress on "Animal Industry": "If Congress does not pass a general law providing plenty of "money to stampout pleuro-pneumonia and other contagious diseases of live "stock, they will commit horrible destruction among our cattle, sheep and "swine, as they have been doing for half a century or so in the United "Kingdom." What has happened and is happening to our neighbours may any day happen to ourselves. "One ounce of prevention is worth a pound of cure!" 15. Generally speaking, there are not trees enough on our farms to shade the cattle. This applies to all the older parishes of the Province of Quebec. In our district we have to go 15 or 20 miles for fuel, and the timber left cannot last long. Many purchase coal at Montreal, and heating costs more than in the city. We pay $6 to $7 a cord for hardwood 3 feet in length, and there is but a small quantity for sale. We have a turf bog which is a great help to the poor, but it is not large and the bed is only from 3 to 6 feet in thickness. The cordwood we buy comes from the Eastern Townships. Montreal is our market for lumber; barbed wire is taking the place of rails for fencing, it is much cheaper than rails. We might plant a large number of trees on our farms, which are so exposed and unsheltered. Near the buildings, on the roads and in many places, the planting of fine trees would greatly help to ornament the farm, to shade and protect the cattle from the burning sun, and particularly to break the force of the wind. How often do we not see heavy, tender fields of grain lost to the extent of one-fourth or one-half from being twisted, broken or prostrated by the force of the wind? Could we not have live hedges, as they have in Europe? 16. The new trees which have succeeded to those of the primitive forest are those that grow naturally on the banks of watercourses, on the roadsides or near fences. They are left to themselves and are of slow growth and are frequently in a poor, stunted condition. The Act of the Province of Quebec, for the encouragement of the cultivation and planting of forest trees, has certainly diminished our apathy in the matter. Several persons have begun planting trees near their buildings and close to the roads. I think the appointing of a holiday for the planting of trees will do much good. Those who planted trees last spring met with very good success. The season was highly favorable, and I hope that next spring greater enthusiasm will be manifested, and that the day will be kept by a larger number of persons, and also more intelligently. 17. I do not know of any attempts at planting forest trees in this district. I have seen pieces of ground covered with second-growth timber. Second-growth trees are generally finer trees, with fewer roots, and a healthier and much more rapid growth. Several persons in this district have planted the Giguera or Neando maple, and some with fair success. I saw plants with a growth of from 4 to 6 feet since last spring. I think this maple is susceptible of easy and profitable cultivation. The greatest enemy of our little patches of timber is fire. The cattle do much harm to sapplings and young trees. In the older parishes and especially in the vast prairies of our North-West, the cultivation of forest trees is of the greatest importance. It would be very wise to give a proper direction to the enthusiasm of those who are attempting to do something in this branch of culture, and to promote the establishment of nurseries. It is necessary to furnish information as to the most useful and most easily grown trees. Our forest trees are very fine and sufficient for all needs, but they are of such slow growth that it would be well to substitute foreign kinds. We can import them as shoots or cuttings. The cultivation of exotics from the seed is the best means of creating nurseries for multiplying and acclimating. For further development, *see* correspondence in *L'Etendard* of 7th May last, headed "Arbor Day." 18. Farmers will derive great benefit from the establishment of a Central Bureau of Agriculture. As a centre and source of information, I consider that no public department would be of more service, and that the public would eagerly resort to it for that information. You cannot name a country, where agriculture is followed with the least care or attention, which does not enjoy such an organization, by whatever name that organization may be known. The staff of the Bureau should be competent men. They should love and be devoted to agriculture. It would be their duty to furnish information when asked for; to give lectures in various parts of the country, especially on subjects of general and practical utility. They should attend meetings of the grangers, agricultural societies, stock-raisers, millers, manufacturers of agricultural products, of preserved meats, of farm implements, forestry congresses, natural history societies, industrial and agricultural, Provincial, county and even foreign exhibitions. In each case a report should be made, and the report should remain for general information and reference. They should issue monthly bulletins and supplementary papers whenever called for by the importance of the subject treated. The more important reports should be condensed and given to the public. The staff can also cause meteorological notes to be kept in various parts of the country, analyse the varieties of soil in each district, with complete notes on the flora, the class of agricultural products, fruit trees and animals and their products; all these notes to be carefully compiled and classified for the information of the public. Lastly, the Bureau should procure and carefully mark specimens of all products of the soil, animals and fruit trees; it should also have specimens of foreign products and an account of the mode of production, with full reports whenever the subject matter is of a nature to be profitably introduced into the country. The source of information and instruction for the staff of the Bureau would be the agricultural literature of the most progressive countries in each branch or subject of study; treatises on the arts and sciences most closely connected with the art of agriculture. In order not to weary your patience, I omit a number of other subjects, but you must see that there is no lack of work to be done by the officials. In order to have method, science and reason where routine has hitherto reigned supreme, you must have more than one man; you must have several heads if you wish to see agriculture leave the old beaten track. 19. It is evident that the benefit of the information which a body of educated men, devoted to agriculture, may gather, abroad and at home, as to the progress of agriculture and stock-raising, will be in exact proportion to its diffusion among the class interested. The press will be a good medium, but it will be insufficient. We cannot enter into details of a character too abstract, or too intricate, for the class who read newspapers. The distribution of little pamphlets or treatises would meet the case, and our country school teachers would easily circulate them among the people. Knowledge and information should not be confined to a small number of men; those who are to apply them are the persons most interested in possessing them. 20. A special Bureau of Agricultural Statistics is highly important. I would not stop half way in the road of progress. Nothing is more important than to know the actual and probable available quantity of all the products of the soil, to have the prices, sales and movement of grain, cattle and all their products; nothing more necessary than to know the fluctuations of the market and the rates of freight. It was a Board of this kind which said, last year, to the producers of the West: "Sell while freights are low and prices are good! Sell! Sell!" They did not sell, and what is the consequence? To-day freights are 20 to 45 per cent. higher, and wheat only finds buyers at a reduction of 20 per cent., a certain loss of 40 per cent. This constitutes an enormous loss; but that is not all, the wheat has overstocked all the mills of the country, and the elevators hold enormous quantities. Grain which is available in this way generally becomes an object of speculation, the producer is made the victim of his own eagerness for gain, and the trade of the country suffers. With the facilities for transport we now have, a knowledge of the actual and probable available product is of immense value; it stimulates business and facilitates the fixing of a just and certain price; the producer hesitates less and runs less risk of loss or of asking too much. He sells always at an equitable price, and knows when and to whom he ought to sell. The Bureau is an excellent resource of information for banks, for the wholesale trade and for monied institutions. It is a guide for the existing industries of the country, and is calculated to develope new industries. In short, it is the surest and most impartial indicator of the wealth produced by the harvests of the country. 21. The publicatian of bulletins and monthly statements showing, in distinct reports, the state of agricultural production in all its departments and all its phases, is certainly advantageous. It is not an innovation; the thing is already established by our neighbors. The establishment of such a bulletin cannot cost much. It can be distributed to the press, to public institutions, to Municipal Councils, Mayors, Justices of the Peace, market clerks, &c. The bulletins should give forecasts of the crops of cereals, fruits and hay, and the state of the crops; they should give notice of the appearance of contagious diseases, with the names of the districts infected; the importation (with name of importer) of thoroughbred cattle; the discovery of improved means of promoting the productiveness of the soil; the state of the market for all produce of the soil and of stock at home and abroad, and the prices of chemical manures and of everything required by the farmer. The bulletin might also serve to publish and make widely known all new formulæ calculated to be of use to farmers, as to the mode of preparing composts or chemical combinations, of preparing fodder and feeding stock, and also give plans for new buildings needed on the farm. It would be useful to immigrants by showing the demand for workmen, farm hands, &c. The bulletin should also make mention of meteorological accidents, such as frosts, droughts, rains, &c. It should call attention to the visible supply of agricultural products and elucidate them and all changes in prices and freights. Undoubtedly these bulletins are highly important for the information and instruction of the public. They are the means of diffusing the benefits which the establishment of a Board of Agricultural Statistics is calculated to produce. 9. I have given a partial reply to this question in the 8th answer. Buckwheat failed completely in 1880, and partially in 1881 owing to the green flower lice. The army worm has not appeared in our district. Last year the *calandra granaria* did great harm, especially to the pea crop. I saw some pease each grain of which was more or less injured or eaten. In one case, having bought two bushels by weight, I found that a bag, which always holds two bushels and over, would not hold two bushels by weight, because the pease were partially destroyed. The *cecidomyia destructor* is doing great harm to the wheat.Certain kinds are more liable to injury: for instance the Froment wheat which is found to have no kernels left in many of the heads. The garden louse devours nearly all our turnips, radishes, &c., in the spring. The white butterfly grub has compelled us to abandon the growing of cabbages. Gardeners alone now grow that vegetable; they destroy the insects in the fall, and the farmers buy their cabbages from them. I think the gardeners use Paris green to kill the grubs. I have used it myself, but I do not like the practice. The caterpillars have long since destroyed all our currant bushes. Paris green is a good remedy for this disease of our currant bushes.I have long used it,every year. Very little is needed. The most difficult insect to control and the most injurious is the potatoe beetle. It reduces the yield of the crop fully one third. Some fields are more and others less injured. Paris green is the heroic remedy. It is the only effectual one, and the cheapest. I think the preparations used generally contain too large a proportion of the poison. I put a spoonful in four gallons of water, and when the prepartion is well applied, it is effectual, and does no harm to the plant. The liquid form is far the best. It divides the poison better, is more easily applied and more effectual; besides, the water costs nothing. Since the appearance of the potatoe bettle we find it difficult to grow tomatoes, which it also attacks. The years 1876 and 1877 were terrible years for the quantity of caterpillars; they destroyed our few remaining apple trees, and were so numerous that they attacked the little groves of timber and devoured the leaves of the maples, elms, &c. One of my friends saved his trees by applying coal oil Last year the yellow fly, or cucumber fly, destroyed our pumkins, cucumbers and melons. This was general throughout the district. 10. No measures have been adopted against birds; they do little, if any harm. The only loss is by crows and plover in the fall. The latter are so keenly pursued by sportsmen that they have almost disappeared. We use Paris green, mixed with plaster, for the potato beetle. Many persons have a horror of using it, and prefer to pick off the insects, the consequence being the loss of one-half their crop. It is also used to destroy caterpillars on currant bushes and the grub on cabbage. I do not approve of using Paris green on the cabbage plant; it is too dangerous; the caterpillar is destroyed by mechanical means; it has nearly disappeared of late years. 11. In order to be in a position to inform the Committee as to the losses of the farmer from the operation of insects injurious to the various products of the soil, I need statistics of the quantities produced now, and of their value. I may state, however, that we can no longer grow cabbages, currants or onions. The potato crop is reduced one-third. Pease have been largely devoured by the *Calanda granavia*, and injured especially by rust, the past two years; and the crop of cucumbers and pumpkins was destroyed last year by the yellow fly. 12. Except in the years 1876 and 1877, I do not think the fruit trees have suffered from insects.

46 Woood Street, Toronto, 24th March, 1884.

Dear Sir,—I must apoligise for not replying to the questions contained in your circular long before this.

The fact is it reached me when I was prostrated by sickness. I have been unable to attend to matters of importance till within the past few days.

You will therefore, excuse any want of fulness or clearness that may be observable in the replies.

In the annual report of the Fruit Growers' Association and Entomological Society of Ontario, there is a mass of reliable information on several of the subjects embraced by your enquiry; and if you have not access to them, I shall be happy to send you copies, as far as we now have duplicates.

Yours, &c.,
GEO. BUCKLAND.

G. A. Gigault, Esq., M. P.

1. Canadian farmers have in the older settled districts, almost, if not quite equal advantages with Americans, for competing in foreign markets. In the newer districts, good ordinary roads and railway facilities are of course greatly needed. 2. (1-2) Imperfect cultivation, inadequacy of manure, and want of rotation. (3) Insufficient attention to breeding of animals adapted to soil, climate and markets. (4) Want of attention by private dairies to the science and practice of the art. (5) Imperfect protection of the ground, mechanically and chemically, suitable varities, pruning, shelter and protection. (6) The greatest general deficiency is neglect of farm yard manure, as to quantity and quality, involving incalculable loss. 3. Yes; change of seed, occasionally, with reference to soil and climate, within certain restrictions of the latter, has always been approved in practice. But the greatest care is needed in procuring perfectly prime and sound seed. In this respect much is yet to be accomplished. 4.

There is reason to believe that a uniform and exact system of inspection of cheese and butter would be at least equally beneficial, as in other commercial products. It would tend to raise the quality of our butter, in particular, of which there is pressing need. 5. Yes; carefully conducted experiments in this direction, would lead to reliable information of much practical value. 6. The services of such an official might be made of great advantage, both to farmers and others. 7. Experimental farms and gardens in the older Provinces of the Dominion, efficiently conducted, would materially conduce to the advancement of agriculture, horticulture, forestry and ornamental planting. 8. Birds are sometimes locally injurious to crops, but the depradations of insects are often more or less destructive. 9. Much reliable information on these points may be found in the annual reports of the Fruit Growers' Association, and Entomological Society. 10. We have in Ontario a Statute for the protection of birds beneficial to agriculture, by allowing only persons holding permits to shoot them, strictly for scientific purposes. The conditions of the statute are only partially carried into practice. 11. I know of no reliable data by which this important information could be attained. The facts could only be satisfactorily ascertained by thorough statistical investigation. 12. Timber trees have locally suffered from these causes occasionally, and in some seasons and situations the mischief produced has embraced wider areas. 13. The appointment of a qualified and energetic entomologist might be made of great advantage to both farmers and gardners. In several of the States such functionaries have rendered services of the highest importance to the cultivators of the soil. 14. The most vigilant means should be taken to arrest infectious diseases among live stock, with a view of mitigating their influence and ultimately of stamping them out. A rigid quarantine and more general and efficient veterinary inspections are very much needed. 15. No; many farms in the older settled sections have not enough forest left to meet domestic wants. Both shelter and shade are too often found of very inadequate extent. 16. Hitherto, I believe, no steps of sufficient importance and extent have been taken to increase the production of timber by planting, an object of daily increasing necessity. 17. I have very little definite or reliable information on these matters, which require careful and extended observation, based on a sufficient collection of well ascertained facts, that they may have a practical value. 18. A Central Bureau for the Dominion, if adequately equipped, would become an important means of collecting and diffusing information on the various industries of the country. It could utilize information already obtained by such Provinces as devote attention to industrial statistics. 19. Yes; the widest dissemination of the results thus obtained should be given, otherwise the benefits of the investigations would be very much curtailed. 20. Yes; if carefully done the results obtained would be of benefit to both producers and consumers, by enabling the public to procure information of a reliable character relative to the gross annual produce of the soil. 21. Yes; provided that the information be clearly and briefly stated and circulated, particularly among the classes of people who feel personally interested in the matter. 22. I would suggest that such a Bureau might beneficially include the collection of facts relative to the diseases and treatment of live stock, especially such as may be of a contagious character.

GEO. BUCKLAND.

*Assistant Commissioner of Agriculture, Toronto, Ontario.*

BELLEVILLE, 13th March, 1884.

SIR,—Herewith I have the honor to hand you a copy of the answers to the Committee's queries, sent to West Riding of Hastings, agreed to at an informal meeting, held as therein related.

I have the honor to be, Sir, your obedient servant,

JAMES T. BELL,
*Prof. of Mines & Agriculture, Albert College, and Secretary of said meeting.*

G. A. GIGAULT, Esq., M.P.,
Chairman of Committee of Commons on Agricultural Statistics.

The following gentlemen, having received circulars from your Committee of the House of Commons on a proposed Bureau of Agricultural Statistics, requesting information on certain subjects submitted to them in the form of questions, met by consent at the County Clerk's office, to consult upon the matters contained in said circulars, viz: Judge E. B. Fraleck, Prof. J. T. Bell, Dr. E H. Coleman, S. T. Wilmot, A. McClatchie, Jas. Bird, Hy. Fenn, J. H. Peck. T. Wills, County Treasurer, was invited to take part in the discussion.

On motion, Judge Fraleck was called to the Chair, and Prof. Bell was requested to act as Secretary.

After consultation the following answers to the questions propounded were agreed upon:—

1. Distance from markets. High rates of transit on agricultural produce. Scarcity of labour. Out-door—Encourage the immigration of agricultural laborers, aiding those only who have been trained on the farm. In-door—To offer increased inducements and facilities for the immigration of trained female domestics, from Great Britain and Germany; and we would recommend the Government to establish one or more "homes" in each Province, to receive such female domestics, until provided with situations. 2. Want of proper drainage; especially sub-soil drainage. Want of care in preparing and applying barn-yard manure. Absence of artificial manures. Neglect to extirpate weeds. Root-growing is discouraged by the scarcety and high price of labor. The breeds of sheep and cattle should be improved by the importation of high-class animals. A systematic and uniform mode of butter-making is the great want. The cultivation of such fruits as are most suitable for exportation ought to be encouraged. 3. The importation of foreign seeds, under proper regulation and inspection, would be beneficial. 4. A thorough system of inspection and branding would be likely to enhance the reputation of our butter, and maintain that of our cheese. 5. Yes. 6. The Government should appoint a Public Analyst in every city in the Dominion, who might take cognizance of food substances, groceries, drugs and water, in addition to soils and manures 7. Yes; there should be one such in each Province. 8 and 9. Peas have been injured by the weevil (Bruchus pisi), wheat by the midge, barly by wire-worm and grub, apples by the codling moth (extensively), plums by curculio (Conotrachelus nenuphar), potatoes by the Colerado beetle (Chrysomela decemlineata). 10. No general measures have been adopted to destroy or limit injurious birds or insects, though some attempts in that direction have been made by private individuals. 11. We have no data on which to found any definite information. 12. Not to any appreciable extent 13. Yes; provided the Entomologist met the farmers to give personal explanations. 14. Yes. 15. Timber is begining to be scarce in this riding. 16. Not to any extent. 17. A few attempts have been made by individuals, but too recently to give results. 18. Yes. 19. Yes. 20. Yes; if care be taken to obtain correct and reliable information. 21. We think this could be more advantageously done through the

local newspapers. 22. We think that the suggestions and recommendations asked for in this question had better be made individually and independently.

(Signed) E. H. COLEMAN.
" A. McCLATCHIE.
" JAMES BIRD.
" HENRY FENN.
" JAMES H. PECK.
" THOS. WILLS.
" SAML. T. WILMOT.
" E. B. FRALECK, *Chairman.*
JAMES T. BELL, *Secretary.*

SHIRE HALL, BELLEVILLE, 10th March, 1884.

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1. Difficulty in procuring a sufficient amount of help both in the field and in the house; cost of transport of his produce. 2. (1-2.) General insufficient supply of manure, and prevalence of weeds from neglected fence corners and road sides. (4.) Bad quality of much of our butter; no systematic mode of manufacture. (6.) The fertilizer in general use is barn-yard manure, much of which loses most of its efficacy from being allowed to lie for months in the open, exposed to the action of the sun and rain, which alternately vaporize the volatile and leach out the soluble parts, until only the *caput mortuum* of the dunghill remains. There is also a deficient supply of artificial manures. 3. That would depend largely upon the conditions of climate, soil, &c., under which such seed might be grown and ripened. No doubt there is generally considerable advantage in the interchange of seed; but it must be managed judiciously. Some of the most approved varieties of European grains have been found not to succeed in this country. 4. Such a system would certainly tend to the improvement both of the quality and reputation of our butter, in both of which points improvement is much needed. Our cheese scarcely needs such a system applied to it, its reputation being already firmly established. It might, however, tend to maintain the high quality and certify the identity of our produce. 5. The experiment might be worth trying. 6. Such functionaries are very much needed in Canada a public analyst should be located in each city in the Dominion, who might be charged with the analysis of water, foods, drugs, &c., in addition to soils and fertilizers. 7. Certaily; one in each Province. 8. No material deficiency from these causes, only partial and local. 9. Apples from the codling moths, plums from the curculio, peas from the weevil, wheat from the midge. 10. No general effort has been made, or indeed needed here. A few individuals have adopted protective means to a small extent. 11. No. 12. Not to any material extent. 13. I think it would, provided said officer took the information home to the farmers, by holding meetings in connection with the farmers' clubs and local agricultural societies, as well as by the distribution of tracts on the subjects, and especially I would recommend that tables, containing authentic figures of the beneficial and injurious insects, be placed in the public schools of the several Provinces. 14. I think such extension desirable. 15. This district is fairly well wooded as yet, but the area of forest is being diminished year by year, in some sections seriously so. 16. None that I am aware of, except the planting of shade trees in the city and of ornamental trees by a few suburban residents. 17. I know of none. 18. I think such a Bureau would be of immense benefit both to our farmers and merchants here, and to our reputation and standing as an enlightened community abroad; and would prove an attraction to the better class of emigrants. 19. Yes. 20. I should recommend the formation of such a section, and I think the regular periodical publication of such statistics, especially those which relate to the movements and prices of grain,

cattle, &c., rates of transportation, fluctuation of foreign markets, &c., would enable our farmers to deal more understandingly with the merchants and middlemen who intervene between them and the consumers. 21. I think the most advantageous mode of publication would be through the columns of the local newspapers, especially the weeklies, which come into the hands of most of our farmers. 22. I think the Bureau might offer prizes for the best essays on the cultivation of individual field, orchard and garden crops, on the improvement and ornamentation of the homestead, the management of shade trees, shelter-belts and plantation of forest trees, and for planting successfully the largest area of such trees, &c., &c.

JAMES T. BELL,
*Professor of Mines and Agriculture in Albert College, Belleville.*

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1. Not answered. 2. In the cultivation of apples, in the more favored districts of our Dominion, much loss is occasioned in years of plenty from the abundance of autumn-ripening fruits, the markets being glutted. The majority of orchards hitherto planted have contained too large a proportion of such fruits. Farmers need to have this impressed on them; the difficulty may be remedied by top-grafting with winter apples. In the colder sections there is great need of hardier varities of all sorts which will better withstand the severities of the climate. This might be accomplished either by the introductiin of hardy varieties from other cold countries or the production here of new varities by judicious cross-fertilization and selection. Many of the special fertilizers now sold are frauds, and there are but few where the farmer who purchases them gets value for his money. 3. The judicious importation of suitable seed from foreign countries, having climates similar to our own, would doubtless be a benefit to our farmers. All plants grown as crops for a number of years in succession in the same district, tend to run out more or less, and in such cases new seed from distant localities will usually add vigor to the crop and increase its productiveness. 4. I believe it would. 5. I believe such importations would be a great benefit to all the colder sections in our Dominion, and would, in a short time, result in a great extension of fruit culture in districts where now no home-grown fruit is to be had. 6. I am strongly of opinion that it would, and if faithful examinations and reports on such fertilizers made, and parties defrauding the public promtly prosecuted, the farmers would be greatly benefitted thereby. 7. Such experimental farms or stations should be established in every Province in the Dominion, but the Dominion Government itself should have some central establishment, as at Washington, in the United States, where young trees and plants might be grown and sent by mail to be tested in all parts of the Dominion. Such an establishment should be managed by a Council or Board of Managers, apart from politics, and have a revenue to support it derived from a donation of public lands for this purpose, as in most of the United States. 8. The yearly losses to farmers from the depredations of insects are enormous; a considerable proportion of this loss is preventable by the adoption of suitable remedies. As an example, two years ago about 20 to 25 per cent. of the wheat crop in this section of Ontario was destroyed by the Hessian fly. The best methods of subduing the insect was made known through the press and the measures adopted have been largely successful in subduing this enemy. 9. It would be impossible to answer this question in brief. As a partial reply, I mail you with this a volume I have written on the insects injurious to fruits. A similar volume might be written on those injuring grain and other field crops, and another volume on those which injure forest trees. 10. In this Province much good has been done by the dissemination of practical information as to the best remedies to adopt for destroying injurious insects, a work

which has been done mainly through the agency of the Entomological Society of Ontario. Farmers and fruitgrowers once being aware of the proper course to take are not slow to follow it. 11. Many birds are destructive to fruits, notably the cherry birds and robin. The English sparrow is destructive to both fruits and grain. Neither of these birds should be protected. With reference to insects, see reply to question 9. 12. The forest trees in every district suffer much from injurious insects, particularly from the work of the different species of wood and bark borers. 13. There is no doubt that the appointment of a compentent entomologist who could, during the season, visit the localities where injurious insects were doing most damage and give information to the sufferers and otherwise disseminate information generally on the subject, would effect a great saving to agriculturists generally. 14. No answer. 15. The supply is rapidly giving out. Trees have been and are being extensively planted for shade and ornament, but not to any extent for fuel. 16. Very little has been done. 17. I know of several small clumps of black walnut which have been planted with this view, and are doing very well. The results of street planting everywhere proves that our hard and soft maples would succeed well if planted for forest purposes. Small clumps and single trees of Eurpoean larch have grown very rapidly—a very useful tree for railway ties. 18. I believe it would, if efficiently managed. 19. Yes. 20. I would, as think that the dissemination of such information would enable may farmers to select the best time for the disposal of their crops and thus realize higher prices on an average of years. 21. I am of opinion that they would be worth many times their cost to the country. 22. No answer.

WILLIAM SAUNDERS, F.R.S.C.,
*President Entomological Society of Ontario;*
*President Fruit Growers Association of Ontario;*
*Public Analyst for Western Ontario, London.*

1. Want of intelligent knowledge of the business. Sound agricultural education is as much needed by the farmer as professional education by the professional man. 2. As to fruit, the want of intelligent knowledge of the business. 3 and 4. No answer. 5. Ontario has imported trees and scions from Russia by advice of the Fruit Growers' Association, for cultivation and trial at the farm of the Agricultural College, and dissemination from thence to the colder parts of the Province. Such introductions often give us most valuable fruits. 6. The analysis of commercial fertilizers, to be followed by the confiscation of all not equal in value to the price at which they are sold, would be a benefit. The analysis of samples of soil is of no practical benefit to the farmer. (See Canadian Horticulturist, Vol. VI, page 277.) 7. Most certainly. I believe Canada is the only British Colony that has no Botanical Garden, and it—this fact—is a standing disgrace to our civilization. 8. The fruit crops by insects. 9. The apple suffers most from the codling moth; the plum from the curculio. 10. Isolated cases only of cultivators catching and killing the curculio—no combined efforts. 11. I cannot give details, but estimate that in some seasons fully one-half of the apple crop is rendered unmarketable by the codling moth, and in some seasons the plum crop wholly destroyed by the curculio. 12. Not to my knowledge. 13. The Entomological Society of Ontario is now giving through its annual reports full information to cultivators in Ontario on the subject of insects injurious and beneficial. 14. No answer. 15. There is not. There should be not less than ten acres of woodland in every hundred. 16. Not to my knowledge. The Ontario Tree Planting Act is intended to encourage such tree planting. 17. None that have come to my knowledge. 18. I believe it would 19. I believe such dissemination of information very desirable. 20. I would. The intelligent fruit cultivator would be able to ascertain

what fruits were in demand and where; whether there was likely to be a deficiency of any particular fruit or a surplus; whether to sell at home or ship abroad, &c. 21. On this point I am not prepared to speak positively, but am inclined to believe that it would be sufficient to issue such bulletins monthly, from July to November. 22. No answer.

D. W. BEADLE,
*Nurseryman, St. Catharines, Lincoln, Ont.*

1. Speaking from a New Brunswick point of view: want of capital and experience. The surplus produce of New Brunswick has not been greatly in excess of the home demand, and as a consequence farmers have not seen the necessity of producing a better quality of produce, and when it is sent abroad it is not as neatly put up, and therefore appears at a disadvantage. This is very perceptible in the article of butter. 2. No answer. 3. Yes; if pure. 4. Yes; to a great extent. 5. Yes; on this point I obtained the opinion of a nurseryman which was favorable. 6. Yes; but one for the Dominion would be of little use. If schools for agriculture were established in the various Provinces, or say, one in Ontario, one in Quebec and one for the Maritime Provinces, an analyst might be provided for in each, by a subsidy from the Central Government. Samples taken only from the users. 7. As the climate, soil, &c., of the different Provinces of the Dominion vary, the establishment of provincial agricultural schools and experimental farms should be encouraged by the Central Government, where such experiments could be carried on with better results. Ontario already has one and other Provinces will follow, the Maritime Provinces probably uniting. 8. From birds, none; from insects but few, chiefly the weevil, potatoe bug, cabbage moth, turnip fly. 9. Potatoes and plums. 10. Birds, none; insects and bugs: Paris geen, salt and lime; nothing to any great extent. 11. No; wheat at one time had to be given up entirely; of late it has been grown with partial success. With moderate care all the above named articles can be grown successfully, grapes excepted, and plums partially so. 12. I think not. Spruce was attacked, but of late have heard very little about it. Orchards where neglected sometimes suffer. 13. For the Dominion as a whole, yes; much needed. 14. It is very desirable, although this Province at present is particularly free from infectious diseases; such inspectors might be attached to schools and there be made useful. 15. Plenty, although the tendency is to clear too closely. 16. None that I have heard of. 17. Have heard of none. 18. It certainly would, though with the establishment of provincial agricultural schools the staff need not be large. 19. Yes; this isa long felt want and has frequently been discussed by the Farmers' Association of New Brunswick. 20. This would entail a heavy expenditure of money and the information would not be received quickly enough, as a general rule. It would be better to furnish reports of movements of grain, &c., to reliable papers, fortnightly or monthly, for publication. 21 This would be unnecessary if the above suggestion were acted upon, otherwise it would be of sufficient advantage. 22. Yes; under its auspices a Dominion Agricultural Association might be formed, composed of delegates from the several provincial associations, which in turn would be composed of delegates from the county or other societies, thus making a complete connection or channel through which much valuable information could be received or disseminated, and through which reliable statistics could be obtained.

Respectfully submitted,

EDWIN. B. BEER,
*President New Brunswick Farmers Association, Sussex, Kent County, N.B.*

OTNABOG, N.B., 9th March, 1881.

DEAR SIR,—I have endeavored to answer the questions proposed in your circular in a practical way, and as briefly as I possible could (as I presumed you so require them). I am very much pleased that Parliament has taken hold of this matter in earnest, and wish you success in your labours. I am only to glad to contribute, in a small way, what my views are on the several questions propounded in your circular.

I am, &c., yours very truly,
S. L. PETERS.

G. A. GIGAULT, Esq.,
Chairman of Committee on Agricultural Interests,
House of Commons, Ottawa.

1. The want of a more thorough knowledge of the kind of crops best suited to the various soils and the most economical method of making them more productive. The scarcity of cheap labor is largely felt also. 2. (1) Possibly a want of more thorough cultivation of the land. (2) None. (3) Farmers not sufficiently careful in securing good breeding animals. (4) In the production of butter the great want appears to me to be, the reluctance on the part of our farmers and dairymen to supply themselves with the most approved implements with which they can convert their milk into butter. By far the larger portion of them seem willing to stick to the shallow-pan system of their fathers. This might answer a portion of the year, but is ruinous for the other part of the season. With the deep can, or creamer as it is called, in use in our dairies, the first step towards making a good article of butter is secured. With these cans submerged in cold spring or ice water, there is no difficulty in securing all the cream from the milk in twelve hours, either in dog days or any other time. With a good article of cream there should be no difficulty in producing a first-class article of butter which will command the highest price. The cheese of the Dominion will command a good price in any market. (5) Proper cultivation and pruning. (6) Barn-yard manure, superphosphate. 3. A change of seed is always desirable every second or third year. If made from a country whose climate is similar to ours, would consider it beneficial. 4. It possibly might in a foreign market, from the fact that it would prevent, to a large extent, the shipping of any but a first-class article to such a market, thus making the quality uniform. A system of inspection for the home market would be attended with many drawbacks and annoyances to first-class dairymen. Inspection, too, would be somewhat costly. In my opinion it would be better to aid by a bonus the establishment of creameries and butter factories, where the article made is sure to be of a good quality. The dairy interest is among the first, in the products of the Dominion, and anything Parliament can do to raise the standard of its production would be directly in the interests of all classes. 5. Our nurserymen and fruit growers have already a large list of fruits from which to make selections; still it might be desirable to import scions and plants from other countries of a high standard. The more important thing just now is, I think, to impress our farmers with the idea that if they wish to have good fruit they must cultivate and enrich their orchards and keep trees properly pruned. 6. Most certainly. We, in New Brunswick, feel the loss occasioned in not having such a person employed by the Government, with whom the farmers might feel free to consult. The residence of the public analyst should be at or within easy distance of the Experimental Farm, if one was established. 7. I look upon the establishment of an experimental farm in New Brunswick as a most desirable thing. The science of agriculture is as yet but poorly understood by the great mass of farmers. A well conducted experimental farm would be an assistance in helping to discover the hidden things in connection with agriculture. 8. The Colorado beetle has proven very destructive to

potatoes. The grain-aphis did a great deal of injury to the oat crop in 1882; the yield in many cases did not exceed twenty bushels to the acre, and of light weight. The squash bug (*coreis fristis*) proves very destructive to all varieties of the squash, cucumber, &c. The army worm (*lencania unipuncta*) proved very destructive to the hay crop, on alluvial lands, in the valley of St. John, in 1882, many farmers losing almost their entire crop. 9. Fruits—The apple suffers most from the apple tree borer and codling worm. The pear, cherry and plum from the slug (*selandria cerasi*), which preys upon the leaves, destroying them, and thus prevents the fruit maturing. The plum suffers largely from the *curculio*. Small fruits, such as the gooseberry and currant, suffer from the depredations of the currant worm, to a large extent. Birds do little damage to crops. 10. Farmers use Paris green to destroy the Colorado beetle. Hand-picking has proven the only sure remedy against the squash bug. The army worm pest is without a remedy this far. Hellebore has proved of service in the destruction of the currant worm. 11. Cannot form any estimate. 12. Not to any extent. 13. It is reasonable to suppose it would. 14. Fortunately our section of country is comparatively free from infectious diseases among stock. No doubt, however, that such inspection at stated periods would be of great advantage in guarding against disease. 15. Ample. 16. None. 17. I know of none 18. Yes. (Emphasized). 19. The information gained by the Central Bureau would be of little benefit if it was not disseminated by handbooks and reports placed in the hands of the farmers. 20. Most certainly; it is just what the Dominion has needed for years. 2nd. A correct knowledge of the market value of his farm products; and the probabilities of an advance or declension in values. 21. Yes; but semi-monthly would be still better. 22. I am of the opinion that such Central Bureaux should not only be informed of the acreage under the different crops, but should also be informed of the average yield per acre, so that the whole productions of the Dominion might be fairly known, or estimated.

S. L. PETERS.
*Farmer Otnabog, Queen's County, New Brunswick.*

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1. Agriculture in New Brunswick, at present, does not suffer from any peculiar difficulties, unless a rather low condition of farming. A fair proportion of the better farmers have adopted an advanced system and use suitable implements; the larger portion do not; the quantity raised is therefore very small. 2nd. The heavy duty on shipments to the United States, this being almost our only export of agricultural produce. (1) The land is not properly prepared, as a rule. (2) Same objection. (3) The proportion of improved animals is too small. (4) Dairies very small; imperfect arrangements. 5. Cultivation of fruit is becoming very general in New Brunswick; great loss was sustained by unsuitable trees from United States nurseries; home grown and grafted trees are more successful. (6) Barn-yard manure; mussel-mud along the shores of the Bay of Fundy and Gulf of St. Lawrence in large quantity; very superior for cereals and grasses. Fish, pumice, superphosphates, plaster, &c. 3. Very much, provided care was taken in the proper selection of kinds and from suitable countries. Some years ago, by direction of Government, I imported wheat from weston Ontario with great advantage. 4. I think it would do much good. The fact that the butter from any of our good farms being branded only second or third rate, would induce more care, both for the better price and reputation. Free traders object, as an interference with trade. No force in this, while it improves the quality and price. 5. The introduction of suitable trees and scions would be very valuable, but each kind should be tried by suitable persons before many are sent through the country; the loss of the trees is as nothing compared with filling the country with poor fruit that people don't like to

cut down and are not worth the space and labour of continuing to care for them. 6. No doubt but good results would follow the labour of a practicable man, but much money is thrown away in paying a man that throws difficulties in the way, when his salary is safe; if he is paid by fees none patronize him. This Province paid such a person for years; very little good. 7. I have no hesitation in recommending such a farm, and think it would be most beneficial. I have recommended that something of this kind should be added to our Government stock farm. This course is recommended from want of means to sustain a separate farm. 8. We have never suffered in New Brunswick to any great extent from the depredations of eitheir birds or insects. Black birds take a little corn, and on several occasions a portion of the Province suffered from caterpillars and different kinds of worms, but never general. I omit the Colorado potato bug, which has been general, but no great loss from it. 9. Except, as stated above, birds have not injured our crops. In addition to caterpillars, grain was injured two or three years in some sections by the midge, and wheat by the weevil (improperly named); apples by the caterpillar, tent worm, &c.; plumbs by the borer, and small fruits by the currant worm, &c. 10. There have been none; each sufferer adopts such means as he thinks, when his crops were suffering, but nothing of a combined or general system has been adopted or found necessary. Great fears were entertained a few years ago that the potato crop would be destroyed, but those fears have not been realized, and the crop has suffered but little. Paris green, London purple, &c., is effective. 11. From the statements given in paragraphs 8, 9 and 10 the Committee will learn that a more particular reply to this cannot well be given. No doubt a certain loss is sustained every year, but no means have been taken to ascertain the value, as it has seldom been serious. 12. A few years since it was observed that the tamarac, known also as juniper hackmatac and larch, were dying; then the fir and spruce were observed to suffer. It extended year by year—it was said a small worm was the cause; this has been questioned, and the real cause is in doubt. The loss is very great. 13. I do not think that such an appointment is required in this Province at present. The duty might be done by some of the present officials, if required. 14. We have not participated in the quarantine regulations at all. I think St. John and Halifax were named stations, but no provision for caring for stock in quarantine has been made. This has been demanded on several occasions. 15. O, yes; any quantity; it is cleared land we want; 95 per cent. of the Province is shade, fuel, &c. I think I am correct in saying not over 5 per cent. is cleared. 16. No; we want the wood cut and the land cleared. At the same time it is acknowledged that more care of the standing timber should be taken, and in many instances it would be good policy to plant maples, larch and some other varieties. 17. Nothing of this kind has ever been done and not probable will be done or required during our time. Reasonable protection is advisable. 18. Yes; this is much wanted. The Local Government has not felt that they could furnish the means for this work, while the need of it has been acknowledged frequently. If no other arrangement is made it could be added to the the Provincial Department of Agriculture. 19. Yes; this is much wanted. I have application very often from the Dominion officer for emigration for such information; at this time I have a long complaint from him that he cannot obtain this very information. 20. I would. I have done so to the Local Government; the great need of this information is acknowledged at all times, but never so much as at present. The present grant for agriculture is as large as our Legislature cares to make it, and it is all absorbed before this service is reached. 21. I think they would; if not at once, they would very soon; it is surprising how much settlers from the old country want such returns. It would do good. 22. I can only repeat my opinion of the benefit to arise from a correct return each year, as early as the information can be obtained of the crop harvested, and two or three bulletins issued during the season, giving estimates of the breadth of land under each crop, and yield per acre.

(The above answers are given from a New Brunswick stand point, as I do not assume to speak from any other.)

JULIUS L. INCHES
*Secretary, Board of Agriculture, Fredericton, New Brunswick.*

1st. The want of better distribution of thoroughbred stock. 2nd. The circuitous route of transportation and the absence of agricultural reciprocity with the United states. 2. (2) The lack of variety in grasses. (3.) The want of stock for dairying purposes, and finer grades of wool. (4.) Carelessness and want of knowledge. (5.) Neglect of interculture, and lack of horticultural interest, there being comparatively few orchards in the Province. 3. I should say it would. We find the cereals, particularly wheat and barley from the other Provinces, better for seed than the growth of the Island. 4. Nothing could be better; besides enhancing the value of these articles it would act as a stimulus, putting new life and vigor into the whole dairying branch of industry. 5. Should think that experiment would be advisable. 6. I think it would be a great advantage, as it would greatly aid the farmer in the application of fertilizers. 7. It would be most advisable in our agricultural interests. 8 Considerable. 9. Wheat from the midge or weevil and cabbage from the green worm. 10. None. 11. Should say about $1,000. 12. No. 13. Undoubtedly. 14. Most desirable. 15. Yes. 16. None. 17. No answer. 18. The establishment of a Central Bureau for the purpose enunciated would be of incalculable value to the Dominion agriculturist, forming, as it were, the head of the farming industry, through which useful and reliable information could be obtained on all important questions appertaining to the general welfare of the agricultural industry. 19. Most certainly. 20. Such information would be of great benefit, as it would enable the farmer to dispose of his surplus stock and produce to the best advantage, and also as a guide to production. 21. Yes. 22. No answer.

PETER J. D. EDMOND,
*Farmer, Sommerville, County of King's, P. E. I.*

March 19th, 1884.

PORT WILLIAMS, N.S., March 17, 1884.

SIR,—With pleasure I enclose your list of questions, which I have answered to the best of my knowledge and belief, and trust they may be of some assistance to you in promoting the laudable object you have in hand.

I am glad to know there are members in the present House who are willing and able to advocate the cause of agriculture, which has too long been allowed to take care of itself; and I sincerely hope you may be successful in inaugurating a new era in the agricultural prosperity of our great Dominion.

With best wishes for your success, I am, Sir, yours very truly,

C. R. H. STARR.

To G. A. GIGAULT, Esq., M.P.,
Chairman Committee on Agricultural Industries.

*Translation.*

1. The force of habit among a great number, and the want of instruction among the greater portion, are the causes why sufficient attention is not paid to the fluctuations in the foreign markets. 2. Our farmers confine themselves too much to raising wheat and other grains, and do not engage sufficiently in stock-raising; and in stock-raising they do not select what pays best. Respecting dairy purposes, large animals cannot be selected; their nourish-

ment costs too much. It is the contrary if it is desired to export meat; then large animals are a necessity. 3. It would be a great advantage to our farmers. Every time I sowed imported grain my harvest has always been more abundant. Nevertheless, several have been deceived in the purchase of wheat; they bought fall wheat instead of spring wheat. 4. I think that the inspection of butter and cheese would be a great benefit to the farmer, because only what was good would be sold, and we would obtain a good price for it. 5. Such importation could not but be very useful. If nothing had ever been imported from the old countries, our Province would not have had as many fruit trees as it has. 6. The appointment of an analyst might be very necessary, but it is not what I would most desire to see. It sometimes happens that these appointments are made where they ought not to be. It would be a useful thing if the person appointed was competent. 7. The establishment of such a garden or farm would be very useful for us, and I might say that this is absolutely necessary, perhaps indispensable, for us. 8. During the past few years the crops have suffered severely from insects. 9. The wheat has suffered much from a small insect, called the small white worm; the hay has been eaten by a small fly called here the flea. The beans have been almost entirely killed for three consecutive years; they were devoured by a blue fly. During the past few years our potatoes have been saved—thanks only to Paris green. Every one knows the insect called the potatoe bug. 10. I do not recollect if any steps have been taken to protect vegetation against those insects. 11. I cannot state precisely the damage caused by these insects; but I am able to state with certainty, that within the space of one week the blue flies have devoured, on my property alone, a bean patch worth sixty dollars ($60); they carried everything off, and so it is with the other crops when these little insects make their appearance. When hay is attacked by the flea its value lowers at once by one-half. Hay usually averages one ton to the acre. 12. During the past few years our sugaries, as well as our orchards, have been devoured by caterpillars. They ate all the leaves, and killed a great number of trees. 13. I think that the appointment of a person qualified to instruct us about birds, beneficial and injurious, would be a good thing for farmers. 14. For our locality I see no great need for a system of inspection to ascertain the diseases among animals and poultry. 15. Very far from it. 16. Nothing of the kind has been done to my knowledge. 17. Attempts at tree-planting have been made of late years. All have not succeeded. The trees planted should be suited to the soil in each case. Thus, maples should not be put where ash or cedar would be the proper thing. Our people think only of planting the trees they fancy most, without reference to the kind of soil. 18. I think all farmers would derive benefit from the establishment of such a Bureau. 19. The distribution of pamphlets instructive for the people, is always popular, would do good and greatly help to improve the farming class. 20. I strongly recommend the establishment of such a Bureau, and farmers could no longer say they are led astray by the newspapers, as they now often say. 21. It undoubtedly would be more than an equivalent for the expense involved.

P. R. PELLETIER, *Farmer*.
ST. CÉSAIRE, ROUVILLE, P. Q.

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1. The great defect is that our farmers follow no system of rotation. Another is the poor quantity of our seed and stock. 2. We grow grain year after year with hardly a year's interval for rest; hence comes exhaustion of the soil and the fact that we never have plump, clean grain. A beginning has been made as to improving our stock. A proper care of manure is entirely neglected and is, in fact, a thing unheard of. 3. It would not be beneficial to import seeds from foreign countries, in my opinion, more especially those seeds which have been

so highly vaunted and which are worthless here. Good seed grown within a distance of say 30 leagues, are the seeds that grow best. 4. I think so. 5. Yes, very useful and would certainly succeed. 6. It might be of some use, but it is not of urgent necessity. 7. Without any doubt. It is better that the experiments should be made by the Agricultural Commission than by the farmers. 8. The injuries inflicted by insects are steadily increasing; whole crops are thus often lost. 9. The wheat is destroyed as soon as it appears. It is also devoured when headed out. The peas are eaten in the pod. The apples are also injured by a worm which attacks the fruit at the heart. 10. But little has been done as yet. 11. The general losses on grain and vegetables are enormous. Here wheat is largely destroyed by insects as soon as it springs up. 12. Only the apple trees. 13. Yes. 14. The need of this is not felt here as yet. Our cattle are, as a rule, free from disease. 15. The forest is [illegible] disappearing. Firewood is becoming scarce. Tree plantations are [illegible]rous. 16. No answer. 17. Trees are planted in front of the houses and along the road. Some persons have begun planting maples for sugar. 18. I do not see what advantages our farmers would derive from it, at least just now. 19. I think so; but the information should be given in a style which farmers would understand. 20. The advantage would not be sufficiently general; a farmer here and there might benefit. Besides, the newspapers already furnish the information mentioned. 21. Let the agricultural papers subsidized by Government be entrusted with that work. 22. I have conducted successfully a large farm. My success has always surpassed my expectations. However, I do not feel warranted in giving advice.

REVEREND LS. ELIE DAUTH,
*Parish Priest, Upton, Co. Yamaska, P.Q.*

1. A want of practical instruction. There is nothing but routine. We should have a farm subsidized, say by each rural district, where the farmers could learn by example, and where they could procure grain and seed at a low price. 2. Too numerous to mention. Every thing is yet to be done. Reforms have now been urged for many years, and seed grain furnished, and yet progress is very slow. Something is needed to give things a start. 3. Yes, and I think, especially seeds for the various pasture grasses. These are sold at too high a price and yet they are the basis of the production of milk for the butter and cheese factories. 4. Yes, I think so. 5. The Horticultural Society of L'Islet has made the experiment this year, by presenting to each of its members twenty-five apple tree scions. 6. Yes, particularly if he were enabled to receive and return the samples free by mail. 7. Certainly. 8. The imported sparrows are beginning to plague us. Potatoes still suffer from the bug. Last year we had an insect, which I believe to be the army worm, in large numbers. 9. Potatoes. 10. Our efforts are confined to the potatoe bug, and the caterpillars on the fruit trees and currant and gooseberry bushes. 11. No. 12. Yes; particularly the spruce. 13. Probably. 14. No answer. 15. Yes. 16. No; except by a few amateurs. 17. There are many apple plantations. Within the last two years a few persons have planted Giguère maples, a few black walnuts, sugar maples, and spruce trees; and so far their efforts appear likely to be successful. 18. No answer. 19. An excellent effect. 20. Yes. 21. Yes, I think so. 22. The statistics should, I think, be gathered from the Councils of the agricultural societies. Each Director should answer for his locality, and assume responsibility for the accuracy of his statements, otherwise the statistics might be unreliable.

H. J. J. DUCHESNAY,
*La Beauce, Beauce, P.Q.*

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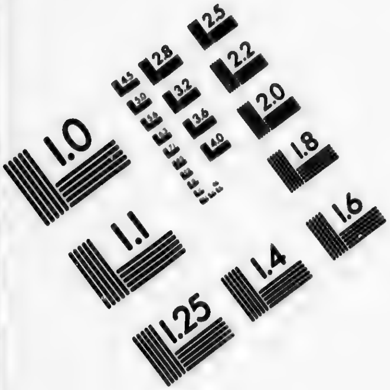

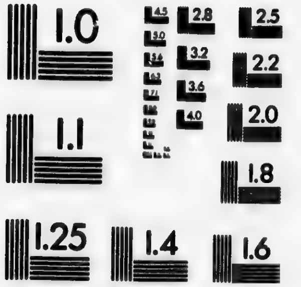

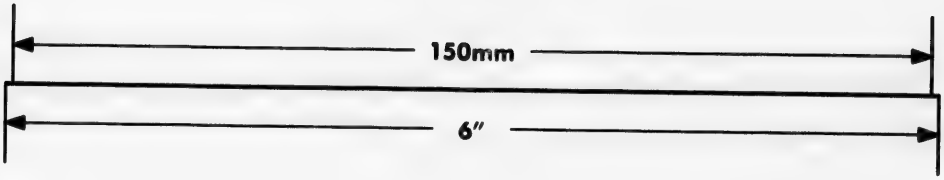

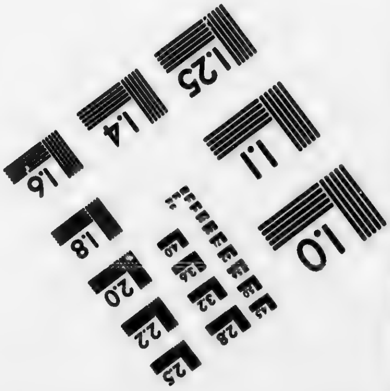

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1. Mainly the want of scientific agricultural education, which a sufficient number of agricultural schools and colleges, with experimental farms, would supply. 2. Often the want of technical knowledge, which agricultural education should supply. 3. Yes. 4. Probably it would. 5. Yes; some of our most valuable fruits have been introduced in this way, and it is but reasonable to expect that others might be discovered that would prove of equally great value. 6. Yes; at present farmers have no means whatever of gaining such information as they require, and would often gladly avail themselves of, if such an officer were appointed. 7. Undoubtedly; if one or more were established in each Province, which would be necessary to ensure satisfactory results. 8. No, in reply for birds; insects, yes. 9. Wheat is injured more or less by the midge or weevil. Potatoes are threatened by the Colorado beetle, which made its appearance last season. The canker worm has made havoc with the apple crop in a few orchards. The apple tree caterpillar has to be closely watched to prevent complete destruction of crops in some localities, but only requires vigilance on the part of the orchardist to control. There is also an insect that has in some cases attacked the blossom with serious effect. The curculio injure the plums and cherries to some extent. 10. Individual interests guarded in a greater or less degree. 11. Perhaps no country is more free from these pests than is Nova Scotia; yet insects are undoubtedly on the increase. In the above list of products, which are all more or less grown, the cabbage and currant require more protection from enemies than any other. 12. No. 13. Yes; much information is required to enable farmers to contend successfully with the increasing insects. 14. It would be advisable to have local agents throughout the country, whose duty it should be to inform the proper authorities of any appearance of disease among farm stock, and in case of infectious diseases immediate steps could then be taken to deal with it, as appeared necessary. 15. No; coal is largely used as fuel. 16. No. 17. No answer. 18. Undoubtedly! yes! 19. Yes; would prove of great value, no doubt. 20. (1st.) Yes. (2nd.) Showing the resources and supply of the country would enable the agriculturist to make comparisons that would govern the productions and disposal of his crops to the best advantage. 21. Yes. 22. My experience has shown that the general subject of the foregoing questions is of the greatest importance to the agricultural community, upon whom the prosperity of all classes must depend, and the importance of the fostering care of the Government cannot be over-estimated.

C. R. H. STARR,
*Farmer and Fruit Grower, Secretary Nova Scotia Fruit Growers' Association,*
*Port Williams Station, King's County, Nova Scotia.*

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1. Unable to answer as regards British labour, beyond stating the fact that wages are so high here that agricultural improvement, under present circumstances, is much retarded. 2. In British Columbia, cultivation and stock-raising are carefully prosecuted and with great success. Fruits of the first quality are raised on Vancouver Island and the Lower Fraser, but so far, not with marked success in the upper country. Fertilizers in ordinary use—barn-yard manure, fish refuse, sea-weed occasionally, and recently dried fish scrap. 3. The importation of choice seeds would be a boon to many farmers, who would, I think, cheerfully purchase in moderate quantities, even at an advanced rate. 4. Not in British Columbia, where the local product is chiefly consumed within the Province. 5. Probably as regards some portion of the Mainland; but lower down and on Vancouver Island the finest varieties thrive. 6. Not at present in British Columbia. 7. Decidedly. Any movement in that direction would be, in my opinion, most advantageous. 8. No. 9. No. 10. I believe that all our birds are indirectly beneficial to agriculture; but many farmers, provoked by occasional damage to fruit or grain, and ignorant

of the good service the birds render at certain seasons, wage war against them, nothwithstanding that there are special local laws for their protection. 11. No. 12. No. 13. Scarcely in British Columbia; at least at present. 14. Not requisite here under present circumstances. 15. Yes. 16. No; not being yet necessary. 17. Ornamental trees of divers kinds have been successfully introduced, and are much prized. Some varieties of the eastern woods might be advantageously cultivated for useful ends; for instance, the sugar-maple, the hickory, the elm, &c. 18. Questionable, as regards British Columbia, at least at present. 19. Partially in British Columbia; possibly greater, as I conceive, in the older Provinces. 20. Questionable, as regards British Columbia at present. 21. In any case I conceive that a yearly publication would be preferable. Monthly reports, from their very frequency, would probably attract little attention. 22. The importation of valuable seeds, such as the improved varieties of vegetables, small fruits, &c., and choice samples of cereals (such as is practised by the Bureau of Agriculture at Washington, U.S), would, I think, be highly beneficial. The smaller seeds, &c., to be distributed gratuitously by mail—the cereals, in larger quantities, to be paid for, as stated in article 3.

ALEX. C. ANDERSON,
*Inspector of Fisheries, Victoria, British Columbia.*

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1 to 13. No answer. 14. Yes; they should be extended to include glanders in horses and anthrax in cattle; trichinæ and measles in pigs. A system of inspection should be extended to the North-West Territories (See report of Department of Agriculture). 15 to 17. No answer. 18. Yes. 19. Yes. 20 and 21. No answer. 22. Yes.

D. McEACHRAN, F.R., C.V.S.,
*Veterinary Surgeon, Inspector of Stock, &c., Montreal.*

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1. First, from the farmers not having a thorough knowledge of chemistry, which should be taught in our common schools, that he may understand the analysis of our different soils, grains and plant growth; second, in not having Reciprocity with the United States. 2. (1) Wheat decreasing in yield. (2) Potatoes, decreasing in yield. (3) Apple crop inferior in yield and quality. 3. Yes; if judiciously chosen from countries of equal or more vigorous climate than our own. 4. Yes; if honestly and intelligently performed. 5. Yes; without doubt, and especially so if judiciously chosen. 6. Yes. 7. Yes; it is one of the needs our country has felt the want of, for some time. 8. None from birds, but from insects, yes. 9. The potato from the Colorado potato bug; the apple from the codling moth, aphides, tree borer, and other insects, also from scabbing of fruit. 10. None of any consequence, excepting in some cases the use of Paris green for the potato bug, and pasturage of orchards by hogs and sheep for the codling moth. 11. Potatoes, 30 per cent. loss from Colorado bug; apples, 50 per cent. loss from insects and scabbing of fruit; cabbage 40 per cent. loss from cabbage worm; plums, 50 per cent. loss from curculio, currants, 50 per cent. loss from currant worm. 12. The sugar-maple has suffered to some extent from the borer. 13. Yes; without question. 14. No answer. 15. For shade, yes; for fuel, if used economically for domestic wants, a lack of pine, cedar, oak and like timber. 16. None. 17. None. 18. Yes; without doubt. 19. Yes; especially in that part of the country where the public are a reading public. 20. Yes; it would serve as a guide to the producer what to grow for export as well as for home consumption, giving him the choice as to which he considered the most profitable. 21. I should judge so. 22. I beg to suggest that the Bureau take means to impose and enforce penalties on

such municipalities as neglect to take action in keeping down and preventing the spreading of noxious weeds on the public highways, including railways, and elsewhere within their jurisdiction.

JOHN M. FISH,

*Farmer and Nurseryman, Abbotsford, Rouville, Que*

1. No answer. 2. (1) Want of periodical change of seed and rotation of crops. (2) Want of suitable artificial manures and proper cultivation. (3) Long winters; stall feeding. (4) Ignorance as to the proper manufacture of these articles. (5) Failure of many kinds tried and not found suitable to climate and localities. (6) Artificial manures being sold without analysis are not found to be as represented. 3. Certainly it would, if judiciously chosen. 4. Most undoubtedly it would. 5. It would, provided a judicious choice is made by parties who thoroughly understand our climate, circumstances and wants, and who have made a study of this important subject. 6. Such an appointment would be of great advantage to farmers, provided the fees charged were nominal, and that the analyist, from his known ability and past reputation, was entitled to their full confidence. 7. This is much wanted; but as the climate varies so much in the Dominion, I consider there would require to be at least two, one in each of the Provinces of Ontario and Quebec, as the result of experiments made in our Province would be of little practical use for the other. 8. Yes. 9. Potatoes only, from the Colorado beetle. 10. The usual application of Paris green, or London purple, mixed with plaster, for the above. 11. No; I think the loss insignificant where means have been taken to prevent depredations. 12. No; there are no timber trees in my district. 13. I certainly think it would. 14. I think the present system of veterinary inspection of stock in quarantine sufficient, but there is wanting a Government official with whom to consult and make known any cases of infectious disease among farm stock or poultry, and the necessary regulations for dealing with such. 15. No. 16. No. 17. No such attempt has ever been, or is likely to be made, in my neighborhood, unless the law makes it compulsory. 18. I think it wo[illegible]udging from what I have heard and read of valuable work done by what[illegible]pose to be a similar Bureau in Washington, U. S. 19. No doubt, such would have a beneficial effect; but if scattered broadcast and distributed gratuitously, I do I do not think the benefit would be equivalent to the cost, as thousands of copies would be thus thrown away. I would suggest that in the event of such being done, they should only be given to members of agricultural societies and all other parties be required to pay for them. This would ensure the papers falling into the hands of those taking an active interest in agriculture. 20. A "section" of this kind, through which reliable agricultural statistics could be procured, would be of very great public utility. 21. Not to the agricultural community. 22. The benefits to be derived from such a Bureau would be so general that it is difficult to point out the numerous ways in which it would promote agricultural interests.

J. M. BROWNING, J. P.,

*Vice President Council of Agriculture, P. Q., Agriculturist,*
*Longueuil, Chambly, Que.*

1. When well employed, our season is long enough for *ripening* and *harvesting* the crop, but we labour under one *great disadvantage* in this Province, owing to the length of time the snow remains on the ground; we have got very little chance to drain, clean and mellow our lands and set them in good order, as compared with other countries where the winter is shorter. 2. No answer. 3. Every farmer knows the advantage of frequent change of seed; seed from foreign countries, well and carefully chosen, would be a great benefit to them.

4 It certainly ought to. 5. It would be of great service. 6. I think so. 7. Yes. With good and intelligent management, such a farm would render great services. It is not easy for our farmers to make such experiments (even if they were willing and able to risk them), but they would watch them with much interest, and would not be slow in appreciating the results and benefitting by them. 8. Yes; especially for the potatoe crop. 9. Potatoes from the potatoe bug, and gooseberries and currants from the caterpillar. 10. Paris geen for the potatoe bug, Hellebore for the gooseberry and currant caterpillar. 11. No answer. 12. Our tamaracs were, for the first time, covered with caterpillars, and the tender shoots nearly all eaten off, but I do not think the trees have been killed; we shall find out next summer. 13. Certainly. 14. No answer. 15. No; there is a great scarcity of timber and fuel, and many of our farmers suffer terribly from it. 16. Scarcely, but public attention is beginning to get roused, and on our Arbor Day last spring, a very large number of ornamental trees were planted, but not, of course, on a large scale anywhere. 17. I know of attempts being made to introduce the black walnut in our Province, which, after ten years' experience, are very satisfactory and promising; many people are now growing them. Hundreds of thousands of seeds of the ash-leaved maple (*acer negundo*) have been sown last year, as it has been ascertained, from several years' experience, that it succeeds very well here. 18. The Experimental Farm, mentioned in the seventh question, would appear to me to be more useful than anything else. 19 to 22. No answer.

H. G. JOLY, *Quebec.*

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1. Our natural market, the United, States absorbs $15,000,000 of agricultural products on which $3,000,000 are paid as duty to the United States. The French market is practically closed against Canada for want of direct communication and surplus tax of $7.50 a ton on products imported through a foreign port, also for want of the most favored nation treatment. 2. Fertilizers should be subject to inspection by the Government chemist, and their fertilizing qualities known to purchasers. Superphosphate of lime especially, which can be obtained at a reasonable price, should be subjected to tests and inspection for use in Canada and abroad. 3. It is done extensively by the United States Government. The importation of Black Sea wheat has been done on a large scale by myself (1,500 bushels) in 1869. I produce the sworn statement made before the British Consul General of Odessa, that the wheat imported was superior to anything then in the market. 4. The inspection and branding for exportation would certainly enhance the value, as purchasers abroad would have a guarantee of obtaining a superior article when delivered. 5 The fruits of Canada are known all over the world for their superior excellence; some specialities might be imported, but the most important work would be the multiplication and wide distribution of the best home varieties through every part of the Dominion. Canada is large enough by itself to provide for this interchange of varieties. 6. An agricultural chemist is attached to the Agricultural Bureau at Washington and his annual reports amply show what great results may be derived from his services. As a first step, the Government chemist attached to the Geological Survey of Canada might, with advantage, devote part of his time to agricultural subjects as well. 7. This is done extensively in Washington, where the agricultural grounds surround the buildings of the Agricultural Bureau and Smithsonian Institution. Vast hot-houses propagate millions of plants for distribution. Every home tree, shrub or plant is to be found in the garden properly labelled, and a large number of foreign plants suitable to the climate of the United States are also to be found there. The Government grounds in Ottawa might be ornamented in the same way. 8. The imported sparrow is fastly becoming a nuisance all over the country, by building its nest in the spouts and other places where the accumulation of water is the

cause of considerable damage during the frosty winter weather. Insects have also given some trouble, specially the potatoe bug, called Colorada beetle (*Chrysomela decemlineata*). 9. Other insects attack the peas, wheat currants, and hay. Paris green is generally employed against the potatoe bug. 10. No answer. 11. No answer. 12. No answer. 13. This work is most efficiently done by the Washington Antomologist and if a reproduction of his reports adapted to Canada was published, we would be largely benefited, the two countries being one in an agricultural point of view. 14. Again every infectious disease from which we suffer is common to the United States as well as Canada, and has been most thorougly reported upon by the Washington Department at a large expenditure. I produce some of these reports fully illustrated. A compilation of these reports by the Government Veterinary Inspector in charge of quarantine would be ample for all practical purposes, as there is no object in doing the work over again. 15. Shade trees are very much wanted; timber for fuel is becoming scarce and a source of increasing expenditure. 16. Some interest has been developed in tree planting in the Province of Quebec, by the adoption of Arbor Day, through the Quebec Forestry Association, of which I am secretary. In every city, village, town or township or school, the planting of shade trees is now an institution and will bring about very considerable results. 17. Several attempts have been made to plant trees for timber purposes, the most successful being that of Hon. Mr. Joly's black walnut grove at Point Platon; the other experiments are not old enough to give immediate profitable results. 18. Canada being specially an agricultural country, should long ago have the substance and not the shadow of an Agricultural Bureau. The Minister of Agriculture of Canada has a large yearly appropriation, of which not a cent is spent for the promotion of agriculture. In Washington half a million is appropriated yearly and devoted exclusively to agriculture, the results being immense: no country has done more than the United States for the promotion of agricultural interests. Their yearly report is the most complete and practical now published by any Government. 19. A compilation of these reports by a competent agriculturist and adaptation to our circumstances and published broadcast would put us on a par with our progressive neighbors. 20. We are absolutely in the dark on the agricultural statistics of Canada, although they are of the highest importance to the commercial and agricultural community so as to regulate our production according to the demand and supply; by taking advantage of our five hundred agricultural societies, these statistics could be obtained at a very reasonable price. The director in each township would fill up the blanks, taking as a basis the last Census. The secretary of the county society would compile these blanks and transmit them to the statician for each Province, who would control the reports and group them properly before transmitting them to Ottawa for final control and publication. 21. No answer. 22. It is only necessary to know what immense results have been obtained by the Washington Bureau to come to the conclusion that an increase of 25 per cent. of the agricultural productions of Canada would soon follow its adoption in Ottawa.

J. X. PERREAULT,
*Pupil of the Royal Agricultural College of Circenster,*
*Gloucestershire, England, and of the National*
*Agricultural School of Grignon, France.*

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OTTAWA, 20th March, 1884.

DEAR SIR,—I send herewith my note for the use of your Committee. I return to Montreal on Monday, a.m., where I shall be happy to serve you or your Committee in any further way in my power.

Faithfully yours,

G. A. GIGAULT, Esq.,

T. STERRY HUNT

OTTAWA, 22nd March, 1884.

SIR,—I have the honor to acknowledge the receipt of your letter of the 21st, asking for an expression of my views on certain points submitted by your Committee.

As regards the establishment of a Central Bureau of Agriculture and Forestry, with a proper staff, capable of giving advice, of making or directing inquiries, and of diffusing knowledge of new and important matters connected with field and forest culture, I think it might be made of great use to the Dominion. I need not insist upon the attention which should be given to the subject of domestic animals and their various products by such a Bureau, nor upon the importance of skilled entomologists, who should instruct the people as to the facts known about insects injurious to vegetation, or either directly or indirectly beneficial thereto.

I think the services of one or more trained botanists for such a Bureau would be necessary to obtain and make known information as to the growth and geographical distribution of our native trees, shrubs and plants, and as to the value of those of other regions which may be fitted for introduction and cultivation in various parts of the Dominion. With such studies in practical botany should be connected a botanical museum, showing all the products of the field and the forest, with their uses, so far as concerns our own and similar climates.

With such an Agricultural Bureau there should also be a chemical laboratory, with a competent chemist, to make, when necessary, studies of vegetable and animal products, and also to examine and report upon foreign and commercial fertilizers, and to give directions relating thereto to the various public analysts throughout the Dominion.

I have been asked how far the study of the soils of the Dominion should be referred to such a Bureau, and whether this could not be better done by the present Geological Survey. To this I reply that such study should form an important part of the legitimate worth of the Geological Survey, and can only be properly carried out in connection therewith. The investigation of the various soils and sub soils, their classification, and their comparison over the vast area of our Dominion, is closely related to the study of its physical geography and its geology, upon which the nature and the distribution of the soil depends. With these are to be considered the various natural fertilizers, such as phosphates, gypsum and marls, which are so important to our agriculture.

Not less intimately connected with the geology of the country is the study of the natural waters, both superficial and subterranean, considered in relation to manufactures, to domestic economy and to agriculture. This subject assumes a special importance in connection with the comparatively arid lands of parts of the North-West, where the sinking of wells and the obtaining of water proper for irrigation and other purposes are matters of great moment. In this connection, the salts of the alkali plains should be carefully studied, since as is well known these salts vary in nature in different areas, being sometimes instead of worthless or noxious matters, substances of great economic value. The investigation of all these questions demands not only the services of a skilled chemist, but the co-operation of a geologist familiar with the structure of the country, and should receive the special attention of the Geological Survey, which could thus most effectually co-operate with the Department of Agriculture.

On the other hand, the botanical and other natural history investigations now connected with this Survey, might, in my opinion, so far as they have a practical value, be transferred to the Department of Agriculture itself with great advantage to that Department and to the country at large. Their work would thus form an important part of that of the proposed Bureau of Agriculture.

I have endeavoured in the above remarks to embody some of the suggestions raised by your inquiries, and shall be pleased to answer any further questions.

I have the honor to be, Sir, your most obedient servant,

T. STERRY HUNT, *C.E., of Montreal, P.Q.*

To G. A. GIGAULT, Esq.,

**Chairman of Committee on Agricultural Interests.**

*Translation.*

1. The Agricultural Societies now existing do not fulfil the end for which they were [illegible]. The money spent in this way might be spent in part more advantageously for the development of agricultural industry, and especially the dairy and beet root sugar industries. It is useless to raise grain for foreign markets; labor is too scarce and too dear, and competition with the west is impossible. 2. The greatest defect in the raising of grain is that the French Canadian farmer generally raises too much grain in proportion to the manure at his disposal. It is of the greatest importance that he should increase his herds of cattle, more especially of milch cows. The farmer sows the same crop for too many seasons consecutively. He finds it difficult to procure new or foreign seed in place of what he generally uses. The cultivation of fruit, roots and herbs is too much neglected, owing to the want of knowledge requisite to carry on this branch of farming to advantage. The cultivation of horse-tooth Indian corn, or sorghum, for green fodder in summer, when the pastures have failed, gives the best results when it is kept green in pits, chopped up, and well pressed. I have myself tried this plan and have succeeded well; the practice is not followed as it ought to be. On most of the farms in the Province of Quebec I do not think that, in general, the raising of stock for meat would be very profitable, but consider that the dairy products would suit better. It is, therefore, important to introduce into the Province a breed of cattle more particularly suited for producing butter and cheese than meat. It is necessary to improve our sheep, in order to gather finer wool, so as to support our manufactories of Canadian cloths, which now import fine wools from the United States. A large amount of manure is completely lost on the farm and in the cities; excrementitious matter and scrapings from the streets, which might be converted into excellent compost, are now lost from want of care, and the necessary means for its storage, and its judicious employment. A considerable quantity of matter which might serve to make excellent artificial manures, such as fish refuse, &c., is lost every year on the Gaspé coast. Twenty thousand tons might be made from it each year. The great fault in the employment of manure by the farmer is the placing it in small heaps, instead of spreading and burying it; by acting as he does and leaving it exposed to the sun all the summer, it loses by evaporation the greater part of its value. I have seen this done in the counties far distant from Montreal. Such conduct deserves to be placed among the mortal sins. 3. Yes. 4. I do not think that the dairy industry, especially butter making, is sufficiently advanced to allow of the appointment of general inspectors, more especially as it would be very difficult to meet with a sufficient number of competent persons to carry out these duties in a just and rational manner. The money spent on inspection would be, I think, more wisely devoted to the establishing of an experimental dairy, where the respective values of the implements and apparatus used in the manufactures would be scientifically studied in such a manner as to meet the requirements of those wishing to export their products. This ought to be the starting point. It is also of the utmost importance to disseminate the information necessary for the establishing of butter and cheese factories; because the establishment of butter and cheese factories is the only true way of improving the dairy industry of this country. Inspection may follow later on. 5. I think so. 6. Yes, certainly, the values of home and imported fertilizers ought to be known, in order to prevent the farmers being deceived. 7. The establishment of an experimental farm, where trial might be made of foreign fertilizers, of different kinds of fruits, trees and vegetables, and new varieties obtained from the seed plot, as is done at the school of Lansing, Michigan, U. S., would be very advantageous to the farming class. The power of testing the most modern agricultural implements would also be of great assist-

ance to the farmer. 8. Insects injure greatly the wheat crop. The potato bug makes great havoc among the potato plants. 9. The wheat is infested by the wheat fly; the peas are also attacked by a fly; as regards fruits, the question is beyond me. 10. The best means of protecting vegetation is to protect the birds. 11. The proportion damaged by insects during an interval of five years, may be reckoned: Of wheat, at 30 per cent.; of potatoes, 40 per cent.; of cabbages, tomatoes, turnips, gooseberries, at 10 to 12 per cent. 12. I cannot make any very positive statement. 13. Yes, certainly. 14. In view of the existence of infectious diseases causing considerable loss among cattle, sheep, and swine in Europe and the United States of America, and inasmuch as we are liable to have those diseases introduced into our country through imported animals, it is of the very highest importance that the Government should take all necessary means to prevent the introduction of these diseases, and to combat their diffusion. 15. There is not sufficient, either for shade, for firewood, or domestic purposes. 16. Some trees have been planted, but not in sufficient numbers to deserve special mention. I am under the impression that a premium granted for the planting of trees would do good. 17. Maple, soft maple, and elm trees, have been planted in the gray clay soils along the road side; generally they have succeeded well. 18. The creation of a Department, whose head would have the same powers as the Superintendent of Public Instruction, who would collect all the information possible on matters affecting agriculture, and who would control a staff capable of giving advice, noting improvements perfected here and in foreign countries, who would look after the rational employment of monies appropriated for agricultural purposes, would certainly be very advantageous, and would fill a void which has unfortunately existed for a long time in this country. 19. Certainly. 20. Yes, I think so; but the matter might be put off until later on. 21. Not at the present moment. 22. The best advice I can give to the Central Bureau is to improve and develop agricultural industries, especially the dairy and sugar beet ones. By raising the sugar beet, one would obtain leaves for milch cows in the autumn, and pulp in winter, and consequently a greater number of milch cows might be kept. I cultivated the sugar beet on a large scale for three years for the Coaticook and Berthier companies. But unfortunately these companies never paid the farmers for their roots, and did great injury to this industry. I will communicate to you the result of my slight experience in this cultivation. I did not cultivate the root as it ought to be cultivated, nevertheless I raised beets that I caused to be analyzed, which gave 14½ per cent. of sugar. I am convinced that, with proper cultivation, one could manage to raise beets containing 15 to 18 per cent. of sugar. To do this, deep ploughing of 15 to 18 inches is requisite, as also a sub soil plough. The land must be well drained, with drains extending beneath the greater portion of the land, and the whole well fertilized one year before sowing the beet root crop. With the same conditions, our grain harvests would double in yield, comfort would be found throughout the land, our Province would be placed in the first rank among the other Provinces in America, we would do our part in contributing to make Canada a country worthy of the great Empire of which it forms an important part. If France was enabled to remove the iron yoke of Prussia, by paying a ransom which the world considered impossible for France to do, it was owing to her agricultural products, and especially to the beet root industry. The principal resources of our Province of Quebec are to be found in its timber limits and Crown lands, which are slowly becoming exhausted. It is not wise to wait until our principal resources are completely exhausted before creating another source of revenue. By establishing the industry and manufacture of beet root, on a solid basis, it would assist later on in lightening our Budget. To effect this, a perfect technical knowledge is required, and a perfect skill in business on the part of the directors of our beet root sugar factories, and a capital sufficient to enable the company to cultivate, itself, one-half of the roots required. A large farm would be necessary, on which steam ploughs would be used, which act well in England, and which would lessen the net cost of the beet root nearly one-half. The residue of the sugar refineries could also be profitably used. The farmers would also learn how to make this industry profitable as well for the agricultural population as for the stockholders. Such, in my opinion, is the best way of improving agriculture. In order to raise beet root, fertilizers are necessary; to obtain manure, animals are requisite; in order to feed cattle, the green forage coming from the pulp of beet root is required. In this way agriculture, manufactures and commerce are linked together, and hold each other's hands. Riches will follow. You will pardon me if I have been somewhat prolix, and you will excuse, perhaps, the faults of language which I have committed. I am not a literary person. I am more accustomed to guide the plough than the pen. I have still many things to say in the matter of agricultural industry, and particularly beet root sugar, which is the source of wealth in the north of France, Belgium and Germany. I had an interview with Mr. Legou, before his departure for France. He intends to return at the end of the month to establish himself in Canada. He was sent out by Mr. Dépres, who has beet root sugar factories in France. He says that he intends to raise beet root on a large scale, and will examine steam ploughs while passing through England. He says that he has capital enough to cultivate it extensively. A company which would undertake to cultivate a portion of the roots it requires, and would furnish guarantees, would deserve encouragement from the Government.

J. BAPTISTE LECOURS, *Farmer.*

ST. LAURENT, JACQUES-CARTIER COUNTY, 5th March, 1884.

1. In this section of the Province, wherein all the old lands are impoverished, the defects of the present system of agriculture, or rather those attributed to it, arise from the precipitancy with which it was adopted. Too many theories were preached up at once, some of which had succeeded elsewhere, but which, for us, could not, at the time, offer any practical result. Our country population, so attached to the routine of agriculture, and credulous as they may be in other matters, cannot break suddenly with the past, in order to take up new theories and methods. There is nothing but the proof of the data of agricultural science by practice, and their sanction by the experience of a certain number among us, which could persuade our farmers to enter upon the new course that was traced out for them. Agriculture, the basis of one of our best industries, ought to be progressive without seeking for improvement all at once. With sufficient capital in the hands of the farmers endowed with the necessary knowledge, the system would have come, as a matter of course; its foundations would have been solid, inasmuch as they would have rested upon paying bases. In my opinion, as regards agricultural instruction, they have commenced by the end, instead of proceeding from the beginning. The first elements of this science have not been promulgated or taught. By means of newspapers, pamphlets, &c., only the refined deductions of the science have been taught, if I can so express myself, and by making use very often of incomprehensible forms or expressions, that is to say, beyond the reach of those to whom they were addressed. Let inspectors be appointed, charged with making a report; let them go through the country; we will know then that agriculture has not made everywhere the progress that was expected of it. Before preaching up any system of agriculture, it would have been of more consequence, it appears to me, to have learned to know the soil, to study and understand its nature, its capacities, its needs, even its requirements; the composition of the plants in connection with that of the soil which produces them with the greatest success; the difference of consumption for the support and fattening

of animals of large breed (too much cried up) compared with that of Canadian animals. All this ought to have been made the subject of serious study, before inducing any person to enter a course which was unknown to him. Furthermore, it has not been sufficiently shown to the farmer the numberless advantages which flow from the use of improved ploughing machines, as much to stir up the soil, to cleanse it from noxious weeds, so as to save labor, etc. Implements of this kind ought to be offered more frequently as a reward to the inhabitants of the localities where the need of displaying the ability of such implements is most felt. In fine, according to me, the same system of agriculture has been preached as suitable for every body, for all purses, for all places, and for all lands. No allowance has been made for the extent and atmospheric difference of the country. The natural forces of the soil have been exaggerated or badly calculated, and the means for supplying its needs, by fertilizers, either natural or artificial, have not been sufficiently considered. The nearness or distance of the markets ought to count for something in the adoption of a system of agriculture. The existing system of agriculture, while it has brought about great reforms in certain parts of the country, has been the cause of many mortifications for a great number of farmers, who, not being prepared, desired to make trials on two large a scale. The guarantee of the success of the agriculturist rests, according to me, in more perfect apprenticeship, and knowledge of the agricultural sciences; in the assiduous care taken in the kitchen-garden, in the more intense and consequently more careful cultivation of the land. Furthermore, the greater the number of improved implements of husbandry that are procured, and the more that use is made of them, the greater the certainty of success. If, then, attention is given to the raising of our small Canadian animals, especially to that of our Canadian cow—if the breed is improved by judicious and intelligent crossings, the success of our butter and cheese factories will be only the more assured. If the farmer learns to treat well and to take good care of his animals, and if he continues to improve his produce, I do not see what the disadvantages will be to which he will be subject, when he enters into competition on foreign markets, if it is not the want of inspection made in advance by a competent person. 2. The land is too little worked over, the ploughing is too superficial, made in haste, often at unseasonable times. The harrowing leaves much to be desired—one often sees wooden harrows. The ditches and trenches, &c., are neglected. Noxious weeds appear in masses in many of the fields. In general, the stables are not sufficiently spacious or well lighted. The ventilation is faulty, and cleanliness is not the order of the day. But, in general, animals are better treated than in the past. Fresh manure is employed too much on the surface without been buried in the earth. 3. I am positive of it. 4. Such an inspection made by a competent man, would certainly increase the value of all produce. 5. Necessarily so, but the reproduction or cultivation of these grafts, plants, &c., ought to be tried in various parts of the country. 6. The country would gain much by the appointment of such an officer. The analysis of the soil and fertilizers is the first step to take in the direction of sound agricultural science. 7. The establishment of experimental gardens or farms is not only useful but indispensable to the advance of agriculture. Under the direction of cultivated, skilful and practical men, these establishments render immense service in all the countries where they are met with. Here where the field of experiment has only, so to speak, been skimmed over by the amateur agriculturist in good circumstances, it is very opportune to build up establishments of this kind. Looking, however, at the extent of the country, its variations in temperature, their operations cannot be centered in one locality. There must be two or three establishments in the Dominion, unless their directors, in some way or another, should encourage, in various localities throughout the country, trials by private persons bound to report to the central office. In agriculture, theories are not within the scope of everybody, they may even deceive persons. But practice is infallible. Demonstration by means of successful trials is the best of schools; its lessons travel quickly and they are permanent. The gardens and farms in question, established on more solid bases, and more practical than the majority of our agricultural schools, would render immense service. The choice of the site of such a farm is very important, as much with respect to the cost of the ground, the buildings, and the expense of maintenance, &c., as in respect to the general advantages which may result from it. Lévis or Quebec, where the Government possesses, I believe sufficiently extensive landed property, offer, perhaps, in this connection, greater guarantees than any other localities. If the land is there, there also will be found an immense quantity of manure arising from the quarantine of animals, which can be utilized. In the second place, all the foreign plants which would vegetate in this part of the country, would easily develop there, would ripen their produce there, in fact, all those which would adapt themselves to our climate, would furnish in this way guarantees of acclimatization for the other places in the Dominion. The check experienced in the planting of fruit trees, comes from a want of acclimatization of the plants, and the too unfavorable conditions given them when transplanted, compared with those they possessed previously. The plants of cold countries, and those brought up on this side of the southern boundary of the district of Montreal, are the only ones suited for our country. But there is no doubt but that the trees which would succeed at Quebec, would do the same in other parts of the country. The plants raised here would show themselves always strong and vigorous; they would suffer less from transportation; their condition would be always improved. Do not let us renew the disasters of the past by a trial of plants brought from Rochester or its environs. May our operations at least take a right direction. 8. Not in our locality, except in the case of the potato. Wheat is but little cultivated, and its place is taken by peas or cabbages and other vegetables liable to be attacked by worms, &c. Here there are only a few isolated orchards. The apples suffer much from the ravages of the codling moth. 9. No answer. 10. Not so far as I know, except for the potato bug. 11. These losses are inconsiderable. 12. Yes, to a considerable extent, this year. 13. Yes. 14. Such is my opinion. 15. In our locality, for shade in the fields, no. For firewood and ordinary purposes, yes. 16. No. 17. On the lands I cultivated with my son at Beaumont, we have during the past two years planted at least 400 trees, of which 250 were walnut trees, the produce of nuts sown some three years past, nearly 75 red spruce and red maple, and the balance in ornamental trees. The walnut trees and red spruces were planted along the line of the fences for a length of several acres. We also, last autumn, sowed pippins and fruit stones, in order to raice fruit trees. Our plantations have succeeded very well, and we did not lose more than ten trees; the soil is gravelly, mixed with clay and a little sand. 18. Without any doubt. 19. Short, practical treatises, within the capacity of the farmers, would render great service. 20-21. In our township, few people would benefit by the establishment of such an office, and the publication of monthly bulletins amounts to little here. What is required here are cheap implements of husbandry, and prizes in implements of this kind to our farmers, who are poor, but inspired with good intentions to follow the path of progress.

G. LAROCQUE, M.D., *Agriculturist*.

BEAUMONT, BELLECHASSE COUNTY, P.Q.

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1. Too much grain growing is the trouble, and the number of cattle kept is not proportioned to the extent of land under cultivation. We should keep more cattle. 2. Answered below, as to butter and cheese. Cannot say as to the

other matters. 3. Yes; with proper selection. 4. Answered below, in a special treatise. 5. I cannot say. 6. I think so. 7. It is done in other countries with success. 8. I cannot say. 9. I cannot say. 10. I do not know. 11. No. 12. I do not know. 13. It might. 14. The question is of the greatest importance. It is certainly necessary that the Government should take all possible means to prevent the introduction of those contagious diseases, which are now causing great havoc amongst the cattle, sheep and swine in Europe and elsewhere, and combat the diseases existing here. 15, 16 and 17. No answer. 18. It is a matter of absolute necessity. 19. Most certainly. 20. It would be very useful. 21. I cannot say. 22. I think so.

S. M. BARRÉ, *Professor of Dairying, Montreal.*

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## A SHORT TREATISE ON THE DAIRY INDUSTRY IN CANADA, AND THE MEANS TO BE ADOPTED FOR ITS PROMOTION AND RATIONAL IMPROVEMENT.

T. M. G. A. GIGAULT,
Chairman Committee on Agricultural Industry.

SIR,—Taking it for granted that the chief object of the questions put to me in your circular, is to ascertain my views on the present condition of the dairy industry of this country, and on the means of securing a prompt improvement, I beg to submit, for the consideration of your Committee, the following paper:

I shall consider:—

1. The present importance of the dairy industry, its possible and probable development, and the beneficial effect it is destined to produce on the agriculture of this country.
2. The present state of the dairy industry.
3. The defects of our dairy products; the causes of those defects, and the means I consider most prompt and certain for their removal.
4. The difficulties impeding the sale of our dairy products in competing with like products on foreign markets, and how those difficulties must be overcome.

### PRESENT IMPORTANCE OF THE DAIRY INDUSTRY IN CANADA.

The dairy industry is now the most productive industry of the country. It has assumed such proportions within the last few years, that the annual revenue derived by Canada from it, is about eight millions of dollars.

### PROBABLE DEVELOPMENT.

In order to form an idea of the probable development of this industry, it is sufficient to reflect that of all our agricultural industries, it is the one which gives the surest, most uniform, and most abundant results, and which, from every point of view (agricultural and commercial) is best suited to all the older Provinces.

Moreover, it is well to know that the demand for dairy products is now very considerable, that it is constantly increasing and almost unlimited, as shown by the following facts:—

England purchases yearly 200,000,000 lbs. of cheese and some 250,000,000 lbs. of butter. During the year ending 30th June, 1883, Canada exported to England 57,672,959 lbs. of cheese and 6,230,173 lbs. of butter. This shows that the export of our dairy products is susceptible of considerable increase.

The consumption and import of these products in England is constantly on the increase, and this is accounted for as follows: The price of meat affects the price and consumption of dairy products. The population of Europe is so great and increases so rapidly that the consumption of meat prevents the animals from increasing in proportion to the increase of the population. It follows from this that the price of meat will be higher and higher, and as dairy products are the natural substitute for meat, it is evident that the consumption of those products will be greater and greater.

I shall, perhaps, be told that America will furnish meat to Europe, but up to the present time America has furnished a certain quantity to England only, and very soon it will be obliged to supply the whole of Europe.

We have thus at our disposal, both in England and on the continent, a large, constant and steadily increasing market for our dairy produce.

Hence, the possible development of the dairy industry in Canada is practically unlimited.

### BENEFICIAL EFFECTS WHICH THE DAIRY INDUSTRY IS CALCULATED TO PRODUCE ON AGRICULTURE.

The dairy industry brings about an increase of stock and, therefore, of the manure at the disposal of the farmer. It enables him to manure his farm better. Now, in order to secure a large quantity of milk it is necessary to have good milch cows and to feed them well, and in order to do this, the farmer must improve his stock and his system of farming, if they be defective.

After a few years the farmer who had hitherto been behind hand, finds himself possessed of a better farm, a fine herd of horn cattle and a considerable income; and all this has come about in such a way that he has hardly noticed the changes which have taken place in his farm, and even in his own habits.

Hence, the dairy industry produces a happy series of causes and effects which go far to solve the great problem of the regeneration of agriculture where that regeneration is needed.

## II.

## PRESENT CONDITION OF THE DAIRY INDUSTRY IN CANADA.

### *Cheese Making.*

Cheese making is one of the best understood and most productive industries of the country.

The average quality of the cheese of Ontario is superior to that of Quebec. Nevertheless, Quebec produces some cheese quite equal in every respect to the best Ontario cheese, though on the whole there is much room for improvement.

The fact that Ontario has carried off three first prizes at general competitions, against the whole world, at international exhibitions, proves that the art of cheese making is well understood in Ontario.

Notwithstanding that the Maritime Provinces are best favored by nature as regards the facility of exporting dairy products to foreign markets, they are less advanced in this branch of industry.

*Exportation of Cheese from Canada.*

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|---|---|
| Year ending 30th June, 1883 | 57,041,387 lbs. |
| " " " 1880 | 26,770,182 " |
| Increase | 30,271,205 lbs. |
| Export for year 1883, about | 60,000,000 lbs. |

### *Butter Industry.*

Butter making is much less advanced than that of cheese, in this country.

The cheese industry got the start some fifteen years ago, by the establishment of co-operative or public cheese factories, and it is only of late that attention has been given to the establishment of public creameries.

The principles which govern the making of cheese, were early studied by skilful manufacturers (Mr. Ballantyne and others), and a knowledge of the art rapidly spread. The success which crowned these courageous and deserving efforts, and the high prices of cheese for some years back, have induced farmers (and especially in Ontario) to devote themselves entirely to cheese making, to the exclusion of butter making.

The inefficiency of the apparatus generally used to extract the butter from the milk, the want of necessary knowledge for an intelligent working of this industry, the absence of methods specially adapted to the circumstances of the country, and the poor reputation of our butter on foreign markets, account for the fact that our butter industry can hardly hold its own against the sister industry, cheese making, which seems destined to absorb everything else.

Nevertheless it is highly important to maintain an equilibrium in the production of these articles, for in accordance with sound principles of economy, it is not prudent for a country to devote itself exclusively to one form of production.

Thanks to the initiative of the Local Government, the Province of Quebec has made some progress in the making of butter, and the new undertakings resulting from that initiative, give promise of success. The Province of Quebec is now far more advanced as regards the making of butter than Ontario.

### *Production.*

According to the census of 1881, the production of home-made butter in Canada amounts to 102,000,000 lbs. The production of creamery butter is some 3,000,000 to 4,000,000 lbs.

### *Export.*

| | |
|---|---|
| During year ending 30th ——, 1880 | 14,917,053 lb |
| " " 1883 | 8,106,447 " |
| Diminution | 6,810,606 lbs. |

But it appears that the export of the year 1883-4 was slightly greater than that of 1882-3.

### *Average Prices of Butter in Canada.*

| | |
|---|---|
| Creameries | 22 cts. |
| Townships and Morrisburgh | 19 " |
| Brockville | 18 " |
| West of Toronto | 15 to 16 " |

We can therefore take 18 cents as the general average price.

Danish butter brings an average price, on the English market, of 30 to 33 cents.

Taking it for granted that we should not obtain so high a price for our butter as the people of Denmark, I think that by improving our process of manufacture, and our means of transport, we might increase the average price of butter by at least 7 cents. It is clear that by increasing the price we shall bring about a considerable increase of production.

## III.

## DEFECTS IN OUR DAIRY PRODUCTS—CAUSES PRODUCING THOSE DEFECTS—MOST PROMPT AND CERTAIN REMEDIES.

### *Defects in our Cheese.*

The leading defect in our cheese industry in the Province of Quebec, lies in the packing.

### *Cause.*

The boxes used are not suited for the purpose.

The curing of our cheese is defective at the opening and at the end of the dairy season. The same is the case during the great heat of summer.

### *Causes.*

The cheese factories are too slightly built, and incapable of protecting the product against the influences of the atmosphere.

### *Remedies.*

In order to improve the average quality of our cheese, all that is needed is to impart to a certain number of intelligent cheese-men, the knowledge already possessed in Ontario, and then employ them as instructors or as inspectors of cheese factories, wherever the manufacture is defective.

Diffuse, by means of the press, &c., the knowledge requisite for the manufacturing of good cheese, and the establishment of good cheese factories. It would also be necessary to recommend the making and use of good packing boxes.

## 1.

### *Defects in our Butter.*

Defective butter making by the greater number of our farmers, especially those who have only a small number of cows.

### *Causes.*

The want of knowledge and of the time required for making this product. The ordinary occupations of a farmer's wife are too numerous and too varied, to permit of her giving the requisite care and time to butter making. Labor is at present too high to permit of employing hired help, in such cases, to advantage. For these reasons the making of good butter for export is almost an impossibility on seven-eights of our Canadian farmers.

### *Remedies.*

1. Diffuse general knowledge as to butter making by means of pamphlets, &c.
2. Establish public dairies or creameries.

## 2.

## WANT OF UNIFORMITY IN MANUFACTURE.

### *Causes.*

1. Want of uniformity in the methods followed, and in the principles generally accepted.

2. The butter is made too often by inexperienced persons, who possess neither skill nor taste for this kind of work.

### *Remedies.*

1. The adoption of methods specially suited to the requirements of the country, and the inculcation of one sole theory, scientifically studied and practically tested by intelligent, disinterested men, at an experimental station.

2. The establishment of public dairies or creameries.

## 3.

## WANT OF KEEPING—QUALITY.

### *Causes.*

It is not generally known that two kinds of butter are made, which are considered first quality, but which serve a different purpose. The one has a very marked flavor (as French and American butter) and keeps for a shorter time; the other has a less strongly marked flavor (the Dominion butter, for instance) but keeps longer.

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The latter kind is in every respect best suited to Canada; we make butter only during seven months of the year. Then the butter made for the Canadian market must keep as long and even longer than that made for export. For foreign export it is well known that only butter which keeps for a long time can be profitably made.

### *Remedies.*

1. Diffuse a knowledge of the method of making butter which will keep for a long time.
2. There is no better means of diffusing that knowledge than an experimental station.

## IV.

### DIFFICULTIES TO BE MET WITH IN DISPOSING OF OUR BUTTER WHEN COMPETING WITH SIMILAR PRODUCTS ON FOREIGN MARKETS.

Our farmers keep their butter too long, so that it is too old when it enters into competition with foreign butter on the English market.

The French send their butter to England eight or ten days after it is made. The Germans send theirs within a fortnight. Danish butter is delivered on the English market within three or four weeks after it is made. Our butter has often remained four, five, six and even eight months in the farmers' hands before it is shipped.

It is easy to see that under these circumstances competition is out of the question.

### *Remedy.*

The establishment of creameries.

The establishment of creameries, owing to the quantity of butter made, renders it possible to make weekly shipments, which could not be done when the butter is made only in small quantities by each farmer.

Hence, the article might be shipped from the factory weekly; the duration of the Atlantic voyage is two weeks, and we may allow an interval of another week before the butter is in the hands of the consumer. Thus, there is nothing to prevent our butter from being delivered to the European consumer within four or five weeks after it is made.

If we thus avail ourselves of the scientific and economical means at our disposal, we shall soon be in a position to compete on satisfactory terms with European producers.

### CONCLUSION.

From the foregoing, it is easy to see that in order to improve the average quality of our butter, to insure uniformity in production and facilitate immediate shipment to foreign markets, we must establish butter factories.

The establishment of factories is, then, the most powerful lever we can use to improve and develop the butter industry of Canada.

It follows, also, that it is of the utmost importance to diffuse the knowledge required for the establishment of butter factories.

In order to establish butter factories you need skilful and experienced dairymen, and the only way to get them is to form them. They can be formed by establishing dairy schools throughout the country.

In order to teach butter making in the dairy schools, you must have a definite theory of the process, scientifically studied out and practically tested. This can be done only in an experimental dairy station.

The establishment of an experimental dairy station of the kind at present existing in large numbers in Europe, is the first step to be taken.

The theory studied at the experimental station must be taught in the dairy schools, and practised in the butter factories generally, and the latter will diffuse a practical knowledge of butter making amongst the farmers.

In the last preceding paragraph, we have an outline of the organization of a system of teaching both theoretical and practical, of dairy work, similar to that which is in operation in Denmark, and as regards butter making, Denmark is admittedly in advance of every other country in the world.

We must not lose heart and fancy that a great lapse of time must take place before that system will produce results, for it is not necessary that we should follow in the footsteps of the people of Denmark; we need only take advantage of their experience, and apply their store of knowledge to the special circumstances of our country.

The system of inspection as proposed, aims chiefly at bringing about a reform in the making of our products. As a remedy, I think that inspection would not be effective, for the cause of defective making is the want of knowledge on the part of our farmers, and the peculiar circumstances in which they are placed. Now, inspection will never diffuse knowledge amongst the farmers or provide them with a substitute for labor. Hence, inspection will not have much effect, for the evil is too general as regards butter making.

The whole respectfully submitted,

S. M. BARIE,
*Prof. of Dairy Industry, Prov. of Quebec.*

OTTAWA, February 26, 1884.

The Committe met, Mr. GIGAULT in the Chair. Mr. JOHN LOWE, Secretary to the Department of Agriculture, called and examined.

*By the Chairman:*

Q. Does the law as it at present stands authorize the establishment of an Agricultural Bureau, and the appointment of a Commissioner of Agriculture?—The Act of 1868 constituting the Department of Agriculture would amply provide for the whole of that. The Act provides that the Minister of Agriculture, for the time being, shall be charged with the execution of laws and Orders in Council and the direction of all public bodies, officers and servants employed in carrying out such laws. The comprehensiveness of that section, therefore, covers every single point of the question. The first function of the Department, in the enumeration of its duties, is agricultural. There has, however, been no special vote for the general purposes of agriculture. There have been special votes for particular branches, for instance, cattle quarantine and inspection, the gathering of statistics in certain particular cases, and also grants to exhibitions. Hitherto this has comprised the whole functions of the Department in relation to agriculture.

Q. What steps have been taken by your Department in order to encourage and develop the agricultural industries of Canada?—I have already partly answered that in relation to cattle. Steps are taken by the Department to prevent the introduction of contagious diseases into the country. In cases where cattle disease has manifested a decided epidemic form, as in Pictou, Nova Scotia, the Department has taken special votes and used special measures for extirpation of such disease. Those measures have certainly been successful, and that disease which did prevail in Pictou, Nova Scotia, and which was threatening to spread to the surrounding counties, has been so promptly dealt with that its absolute extermination will, no doubt, be established by the opening of the spring. But if the extermination is not complete, certainly there will be very little of it. I think there can be no doubt, also, that the operations of the Department in relation to this branch of agriculture—for I suppose we may call stock-raising or keeping, a branch of agriculture, in its relation to the farm—the measures which have been taken and the extreme vigilance with which those measures have been carried out, have preserved this country from all attacks of contagious diseases from the outside, and have done for us what certainly has not been done for the United States, that is to say: they have given us immunity from being placed on the scheduled list in the United Kingdom, the result of

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which is that our cattle are now freely exported to the United Kingdon. We can send stock cattle over; they are bought at fair prices and fed in the United Kingdom; the value of that is estimated by exporters at the moderate extent of two cents a pound on the whole gross weight, which is certainly an enormous advantage to the farmers of this country, and under the fostering effects of which the cattle trade has increased within three or four years from almost nothing to its present very large proportions. The cattle quarantine at Quebec, under the immediate superintendence of Mr. Couture, and under the general direction of Mr. McEachran, who is the general inspector, is probably one of the most perfect of its kind on the continent, on the admission of American importers and stock dealers. As a consequence, very large numbers of cattle intended for the United States seek entry to the continent by the St. Lawrence route. We have also a very perfect system of cattle quarantine at Point Edward, near Sarnia, for cattle entering Canada from the United States for breeding purposes—no other cattle than those for breeding purposes being allowed to be imported into Canada from the United States. As a further part of that question I suppose exhibitions may be mentioned. For four or five years past Parliament has voted a sum of $5,000, and last year it voted $10,000, in order to give agricultural exhibitions held in the several Provinces a Dominion character. In so far as the expenditure of that vote was concerned, the operation of the Act of 1868 came into direct effect, as the expenditure was necessarily under the direct responsibility of the Minister of Agriculture. As to the effect of those exhibitions and also the effect of the exhibitions in which the Department has taken part at London, Paris and Philadelphia, it is perhaps unnecessary for me to say anything, but I think it may be fairly claimed that the effects has been to encourage agriculture.

Q. What methods can you suggest for gathering reliable agricultural statistics?—That is rather a wide question, and to answer it in detail would be to present a system. I therefore must give a general answer, and say that of course there are several methods of obtaining agricultural statistics. The most perfect is that which is adopted in the taking of the Census, the employment of sworn enumerators, who have been instructed in their duties, and who go from house to house, and from farm to farm, and take down the information. There are various other devices. For instance, that which is adopted in Ireland is thought to be one of the most perfect. There the returns are obtained by means of the constabulary. The men are under the direction of the Government, and are trained to this special duty. They really get very good statistics. On this continent, however, the information is obtained by circular, or through municipal institutions. The information that can be obtained in that way is always of a most general character and, of course, cannot be exact. I suppose it might be called approximative, but I think even that would be a very strong word to apply to many of the statistics which have been published. Two of the Provinces—the Province of Ontario and the Province of Manitoba—have adopted those systems, and have taken from the practices of the United States those which have been found to be the best. In both of those Provinces those systems, I think, are very fairly and very carefully carried out, and there is certainly a mass of information obtained. I should say further, with respect to the Province of Manitoba and the North-West Territories, that the Government took a special vote from Parliament for the purpose of gathering statistics there, as the information was thought to be of such vast importance to the Dominion. In carrying out that, the Minister of Agriculture made an arrangement with the Department of Agriculture of the Province of Manitoba, that for a moderate subvention they should place their machinery at our disposal and *coad* these particular statistics. Their officers did report direct to our Department. The result was the gathering of a very considerable mass of figures, which appears to stand a fair test, and I think may be called approximate. The tabulation of these figures is now about finally completed in the Department of Agriculture, and I think will be published during the present Session. The Committee, of course, will see the kind of information that can be gathered in that way. Perhaps that is the only kind of information that could be at present obtained, as I feel very doubtful if Parliament would be willing to make a vote sufficient to obtain a direct enumeration.

Q. Do you believe an arrangement similar to that made with Manitoba, could be made with the other Provincial Governments?—There would be no difficulty in the way of doing it, but it would require, of course, the friendly co-operation of the Governments of the Provinces with which the arrangement was made.

Q. Do you think those statistics could be gathered with the aid of the municipalities?—I have already mentioned that as one of the modes of obtaining statistics. You see that system applied in Ontario. You will get approximative results, and many particulars from those results.

*By Mr. Orton:*

Q. You were referring to cattle diseases just now; was there any report from England in relation to our cattle being scheduled this last year?—Not that, Sir; but during the summer there seemed to be an attempt to fasten a contagious disease on two cargoes of cattle, by the "Oregon" and "Nepigon," I think. Our officers in England did not believe there was such a contageous disease among the cattle although the cattle were condemned for slaughter on the ground that it prevailed. Mr. Dyke, the agent of the Department at Liverpool, immediately communicated the facts to Sir Charles Tupper, in London. Sir Charles went to the Privy Council, and from the Veterinary Department of the Privy Council got an order, enabling him to make a full investigation. When he arrived in Liverpool, he was told that all was settled, that the cattle were ordered for slaughter, that the disease was there, and that there was no need to make any further investigation. Sir Charles said "Well, I am not satisfied with that, I desire to have three or four cattle selected from these cargoes, and slaughtered, in order that we may have definite proof." That was blankly refused by the officer in charge. At that point, Sir Charles produced the order which he had brought from the Veterinary Department, and made himself known. Of course, then, he was enabled to enforce immediate compliance with his orders. The result was, that cattle selected as being most likely to have the disease, were slaughtered. They were found to have no disease, and the fact was reported to the Privy Council. The order which had been given on the supposition that the disease was there, was rescinded, and so we escaped being scheduled.

Q. Was there any trouble about sheep?—There have been several cargoes of sheep on which the scab has been found—Canadian sheep—but that happened in this way: our veterinary inspector has refused to allow sheep to be placed on board the steamers on account of the disease, but there has been nothing to prevent those sheep being taken to the United States. They have been taken to Portland, sent to England, and on arriving in England have been slaughtered, certainly under the name of Canadian sheep, but still as coming from a United States port. The Department, of course, has taken the necessary steps to have that position very clearly defined and established. No later than last week there was a case of that kind.

*By Mr. Fisher:*

Q. Is there a report of sheep disease in the Province of Quebec?—Yes; Mr. McEacharn, the veterinary inspector, has sent several reports to the Department recently on that subject, and on those reports orders were given to have the necessary steps taken for its extermination. Those steps are now being taken. The disease seems to be confined to the County of Laprairie and contiguous counties.

Q. I did not know whether it had been stamped out or not?—No; the most active measures are being taken in the matter.

*By Mr. Massue:*

Q. What is the present law regarding the shipment of sheep to England?—There is no impediment to the shipment of sheep from Canada to England. The only restriction is the inspection by Mr. McEachran or some of his officers; sheep found by them to be diseased are not allowed to embark.

*By the Chairman:*

Q. That inspection would take place at the point of embarkation?—Yes, at Montreal or Quebec.

*By Mr. Orton:*

Q. I suppose upon their arrival in England they are inspected?—Yes; they are immediately met by officers of the Veterinary Department of the Privy Council there, and nothing can be more strict or keen than the scrutiny to which all animals are subjected on their arrival. In the case to which I referred a short time ago, there was manifest unfairness, if not design, to place the cattle of Canada in an inferior position last summer.

*By Mr. Fisher:*

Q. You spoke, a few minutes ago, of the importation of breeding cattle from the United States; do they all have to go into quarantine?—Yes; I might perhaps explain that that is an exception to the general order of prohibition, which prevents the importation of cattle from a scheduled country; that is, a country in which contagious diseases, and particularly such diseases as pleuro pneumonia and foot and mouth disease, exist. That prohibition is the single condition on which we obtain imunity from being placed on the scheduled list in England. But by special consent, an exception was made with respect to cattle for breeding purposes only, at one western port; only one western port was allowed, and Sarnia was selected, on account of the very favorable conditions which are found at that point, for the establishment of such a quarantine.

Q. Then, you mean to say that breeding cattle cannot be imported at all from the United States except through Sarnia?—Not at all. The Government cannot order the importation of a single animal at any point but Sarnia, except at the cost of placing Canada on the scheduled list in England, which, of course, is not to be thought of.

*By Mr. Orton:*

Q. Have you any account of the number of cargoes of sheep scheduled last year?—I think we have it in the Department. We have not made it a very special point of compilation, but they have been quite numerous—that is to say, sheep which have not been allowed to be embarked on steamers have been, by their owners, taken to the United States, which we are powerless to prevent, and from the United States ports they have been shipped to England.

Q. And they were slaughtered on their arrival?—Yes; the misfortune being that they have been called Canadian sheep; but the veterinery authorities in England have been made very fully aware of the circumstances which I have stated.

*By Mr. Fisher:*

How many cargoes of sheep from Canadian ports have been stopped on their arrival in England?—I cannot recall one at this moment. There has been no serious danger in that respect.

*By the Chairman:*

What conclusions have you arrived at from your visits to, or investigations of, experimental farms, and so forth, in other countries?—The Department has never made any official visits of that kind; there is, therefore, no information which I can give on that subject. I have myself visited some of these model farms, but not in such a way as to furnish information to the Committee.

Q. Does your veterinary inspector publish reports every year?—The annual report which is published is that of the Minister of Agriculture, which is laid before Parliament every year. It generally contains a reference to the subject and notices special points or facts which had occurred during the year.

Q. In the United States the veterinary publishes a report and says in it what remedies have been employed for different contagious diseases; do you not think it would be well to do that here?—The reports which have been published by our veterinary inspector for three or four years past, have been of an exceedingly elaborate character. They have referred to the diseases which have prevailed and the methods taken or to be taken for their cure.

*By Mr. Fisher:*

Q. Can you give us any idea as to what portion of the expenses entailed by the Department has been laid out upon purely agricultural subjects, and not connected with the Census—immigration and colonization, or subjects of that kind?—Well, in the expenditure of the Department we are strictly, I may say alsmost sternly, guided by the definition of our votes. We are not able to spend money voted for one purpose, for any other purpose, and if we should happen to over-run our appropriation on any one point, of course the Auditor hauls us up for it, and we have to get a Governor General's Warrant. There has been no general vote for purely agricultural purposes, nothing beyond the special votes to which I, in the first place, referred.

*By the Chairman:*

Q. Would the establishment of a Central Bureau, having for its object the collection of information on all matters relating to agriculture, and having a skilled staff, capable of giving advice, making experiments and noting the improvements effected in other countries that might be advantageously introduced into the Dominion, be a benefit to our agriculturists?—Of course, if such an organization were efficient, it could not fail to be a benefit. There arises, however, this question: if the Provinces, by their present systems, gather agricultural statistics, whether we can by their methods make any improvements upon them. Of course there is the further question of skilled direction from the centre; that is one of very great importance, and if the necessary expenditure were made and the necessary direction given, there could not fail to be advantage from it.

Q. Don't you think that the appointment of a Commissioner of Agriculture here is advisable?—I do not know whether I, as an officer of the Department, should answer that question, or whether you had not better get that information from outside sources. I think my previous answer has really covered that. If you had a very intelligent and skilled direction from the centre, you might have an advantage if there were an affiliation, an arrangement of affiliation, with the Provinces. Such a direction, which is provided for by the terms of the Act of 1868, to which I have referred, might homologate, digest and classify into a whole, the parts which the Provinces get together; now, for instance, that little arrangement we have with Manitoba at the present time, is comparatively inexpensive, and promises to be fairly effective. I think the statistics obtained in that way are as approximately correct as any statistics obtained in that manner can be. Of course the system is faulty in the particular that you have not direct control over the enumerators, who are the initial parties to gather the information, on the correctness of which all must depend. So far as compilation is concerned, the Department of Agriculture would be in a very good position to put that into effect. So far as the monthly publications are concerned, in one of the questions which you first put to me, of course their value would entirely depend upon the accuracy of the information given.

Q. Are you not under the impression that the system followed at Washington has been productive of good?—I think there is no question about that. I do not think that accuracy has always marked the Washington publications, but I am sure that many of the experiments which they have tried have been very useful and have led to good results.

Q. Would the establishment of an experimental farm, or garden, where varieties of foreign grain, fruits, trees and fertilizers might be tested, and whence such seeds, plants, &c., might be distributed throughout the Dominion, be advisable?—Of course, every fact useful to agriculture that might be demonstrated by an experimental farm could not fail to be of use. In the Province of Manitoba, at this present moment, there are many important questions still in doubt, which might be determined were such farm or nursery undertaken by the Government, or by private enterprise. There is certainly very much uncertainty at present with reference to the growth of many kinds of trees in the Province of Manitoba, and in parts of Manitoba; and also with reference to what may be the success on the prairies of the growth of fruit trees of certain kinds, especially the apple.

*By Mr. Orton:*

Q. I think the Government have under consideration the idea of establishing a nursery in the North-West?—That I cannot say; but I believe there have been some applications by private persons for subventions to assist in carrying out experiments in regard to the growth both of shade trees and fruit trees.

Q. Do you not think it would be a very desirable thing for the Government to establish some such nursery in the North-West?—As to the absolute desirability of having that experiment properly tried, in the abstract there can be no question. As to the policy of undertaking it, or the expense of undertaking it, or the means available for undertaking it, those are practical questions of great importance, and not free from some difficulties. They have, of course, to be determined by the Government and Parliament between them.

Q. Do you think the end would be better arrived at by the Government establishing a nursery, or by private enterprise assisted by subsidies?—I should not like to say that. Possibly the cheapest mode would be to give a moderate subvention to a private enterprise for a few years, to try the experiment. I have no doubt that the absolutely cheapest mode would be that. But whether that would in all respects be sufficiently effective, or give sufficient control, is another question. Then there is also the question of the Government making arrangements with individuals. It must be remembered that what they do for one they may be expected to do for another, and when you have a precedent set it is very easy to build on that foundation. I do not see any difficulty whatever as to the question of the desirability of obtaining the end. The points of difficulty which I point out have reference to the practical difficulties of obtaining that end. The difficulties of administration are quite serious, and they present themselves in a very serious form to the Minister of Agriculture, though they do not always appear to be quite so clear to those who desire to have the scheme carried into effect. That is rather a Departmental view of the case.

*By the Chairman:*

Q. Would it be desirable to extend the duties of the present system of veterinary inspection of stock in quarantine, and if needful, the staff also, with a view to deal with the local development of infectious diseases among farm stock and poultry throughout the Dominion, and the best means of stamping them out?—I think you will find that the Department of Agriculture, with its present vote for cattle quarantine and public health, and its present staff under Mr. McEachran, of Montreal, and Mr. Andrew Smith, of Toronto, will watch all points of that kind with untiring vigilance; and certainly if ever greater emergency should arise than does arise at present, there would be no hesitation whatever in taking the necessary steps to deal with it. Even if the vote should be exceeded, and it should be necessary to ask for an indemnity, nothing can be more acute than the apprehension of the Department as to the necessity of taking steps to carry out all that arrangement.

Q. Would the appointment of an entomologist, whose duty it would be to give information concerning birds and insects injurious and beneficial, and the means of protecting the crops against their ravages, accomplish any benefit to the farming classes?—Of course, the answer to that question is precisely similar to that which I gave to a previous question, as to the experimental farm. There can be no doubt as to the very great advisability, the very great value of that kind of information. The mode of doing it, the expense of doing it, the machinery by which it is done, are practical questions of administration, which would probably form a part of the first one if it were put into effect. I think they are simply a branch of it.

Q. Would the dissemination of handbooks and reports on agriculture, on matters relating to stock-raising, dairying, poultry-keeping, &c., have a beneficial effect?—There could be no doubt of that, if the matter distributed were valuable. The Department has from time to time, not directly officially, but semi-officially, made enquiries and published the result. For instance, when the potato beetle threatened Lower Canada, the officers of the Department made some very particular enquiries respecting that insect; and Dr. Taché published a little *brochure* on the subject at his own expense, and it was circulated, and some copies of it were bought by the Department for the purpose of further distribution. But there has been no vote for any systematic publication of that kind. Of course, the mere publishing of a pamphlet is not very much, but when you come to publish pamphlets for general distribution, you very soon run up into very large sums [illegible] money.

Q Would the appointment of a public analyist, to whom samples of soil, and of home manufactured and imported fertilizers might be submitted, prove of advantage to our farmers?—There can be no question of the advantage of that either, if it can be done. We have obtained certain analysis of soil in England, in Scotland, and in Germany, especially of the soil of Manitoba, which have been found to be very useful. There was one particularly, by Sir John B. Lawes, which was made last year, of some specimens of Manitoba soil submitted to him, which he found to be exceedingly rich in nitrogens.

*By Mr. Fisher:*

Q. From your replies to these questions, it seems there is no doubt of the feasibility of all the proposals, and it is a mere question whether the return to the country from the establishment of such arrangements would compensate us for the expenditure they would involve?—I think it is rather a question as to whether the country is prepared to go into that thoroughness of organization which would lead to satisfactory results. That is the view which strikes me as a departmental question. Of course, carefulness and accuracy are the great points to be obtained. I think, as to the question of desirability, that if we can get the results, there is, on that point, no question.

Q. From your answers appertaining to inspection of stock and quarantine, they seem to be quite sufficient at present, and that the chief advantage which would accrue to us would be from a new departure in the way of an Entomological Department?—Yes; and the testing of grains, and the testing of trees, and the adapting of fruit trees to the North-West. I think these are questions of almost immediate importance.

Q. Q. Is not the Manitoba Government doing something in regard to that?—There is nothing being done; and the farmers are too busy to do it. I think these are questions of vast magnitude to the North-West, especially in view of the very large expenditures which are taking place there, the very large numbers of people who are going in, and the still larger numbers that might be attracted to that almost illimitable territory. There is one fact which I may state further, and that is that the expenditure Parliament has hitherto made, with reference to carrying on those operations in regard to stock and its care, have been of unspeakable value to the Dominion. I think that the question of cost is almost nothing. It is not a cent in the balance as compared with the results obtained.

*By the Chairman:*

Q. What is the amount generally voted for that purpose?—It is about $20,000 a year; that is, the amount generally voted for quarantine.

Q. I see that in Washington they spend about $200,000 a year for a Central Bureau of Agriculture?—Yes.

Q. And in that sum of money is included about $75,000 for the distribution of seeds from foreign countries?—Yes; and undoubtedly very good results have arisen in many cases from those seeds. There have, however, been complaints that a great deal of the seed has been wasted; that is, that it has not always fallen into the right hands. That kind of difficulty has appeared, judging by the newspaper reports, with regard to the Washington system. I do not give that as evidence, but as mere report. Certainly if any steps in relation to the question might be believed to be as beneficial as have been the steps in regard to stock, you would have one encouragement to go on.

Q. I see that one of the objects of the Royal Society of England is to correspond with agricultural and horticultural societies and practical farmers, and to secure any information that might be beneficial to farmers and to publish it. Do not you think a Bureau of Agriculture here to do the same thing—and I think the Bureau of Agriculture in Washington is doing there what the Royal Agricultural Society in England is doing—would be beneficial?—That undoubtedly might be done, but probably you would have great difficulty in instituting such experiments as those which are now being carried on by Sir J. B. Lawes, in England, as a private enterprise. I think probably you would not be able to get anything of that kind. As to whether a Bureau established by the Government could, in all respects and with the same advantages, carry out these experiments, is also a matter of doubt.

*By Mr. Fisher :*

Q. Is not the Royal Society of Agriculture in England almost entirely sustained by private enterprise?—I cannot say whether it gets a subvention from Parliament or not, but it is undoubtedly simply a private enterprise.

*By the Chairman :*

Q. Do you think we have individuals wealthy enough here to do what the Royal Agricultural Society in England is doing?—No, Sir.

Q. And if individuals here cannot do what the Royal Agricultural Society in England is doing, do you not think the Government should undertake the work?—I certainly do not think the condition of affairs in England can be applied to Canada in this respect.

*By Mr. Fisher :*

Q. Then there is this : The individuals who do that kind of work in England are enthusiasts, and they really devote more care and attention to it than would paid officials of the Government here?—Yes ; they are specialists. Now, if it came to the question of carrying out experiments of the kind referred to here, it is not by any means certain that a man like Sir J. B. Lawes would get the situation. That is one question, and I think they have found some difficulties of that kind at Washington too.

*By the Chairman :*

Q. According to a letter sent here by the Commissioner of Agriculture in Washington, he says there have been very good results from the work of the Bureau of Agriculture there?—I do not think there can be any sort of a question about that. They have garnered a great deal of grain, but I think they have also got with it a little chaff. Still there is no reason why you should not get the grain, if good results. They have in the United States to contend with those two great cattle diseases, and unless they can effect their entire extermination, they never can get off the scheduled list in England. That is a constant, steady embargo upon their trade, and I do say that that extermination, if it can be effected at all, will require a very great effort on the part of the Central Government and the concurrent effort of State Governments, and the cost will be millions. The damage also is millions. There is a movement, and there have been movements to effect that.

Q. According to the report of the Agricultural Commission of Ontario, the farmers lose a million dollars a year on account of the inferior quality of the butter shipped to England?—I dare say that is a fact.

Q. I see that the Ontario Government has distributed handbooks on scientific butter making ; do you not think such a book published by a Bureau of Agriculture here would be beneficial to the other Provinces?—There is not the slightest doubt of that.

Q. That is, if it were published under the control of a very skilful agriculturist?—There is one fact in regard to Canadian butter going to England that is of importance. In the Eastern Townships, from which Mr. Fisher comes, the people have very good facilities for making butter of the very best kind, and there are many skilled butter-makers there applying scientific methods. There butter is bought by buyers from Boston at their doors. It is sent off to Boston, where it is marked New England dairy, while the culls, or inferior butter, are marked Canadian.

*By Mr. Fisher :*

Q. That is changing now?—Yes it is, but it has been going on to my knowledge.

*By Mr. Orton :*

Q. Do you think the herbage in Manitoba and the North West is peculiarly adapted to dairying?—Generally ; the plains can scarcely be said to be peculiarly adapted to that, although there would not be the slightest difficulty in many parts from the richness of the grasses and the facilities with which water can be obtained. I think that in the spurs of the Rocky Mountains the conditions exist in the highest degree.

Q. It is generally thought by those who use butter made in Manitoba that the flavor and the aroma are better than those of the butter of the other Provinces. You are aware that there are many wild flowers on the prairies, and these give a peculiarly rich aroma to the butter.—Of course you can make the very best of butter there, but to say that that is a better butter than is made in the other Provinces would be too much. I think that in the spurs of the Rocky Mountains, where the clear, blue streams run down, there is a rich herbage found, which will give you better butter than on the plains.

The Committee adjourned.

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OTTAWA, 29th Feb., 1884.

The Committee met, W. GIGAULT in the Chair. Mr. CHAS. GIBB, of Abbotsford, County of Rouville, P. Q., called and examined.

*By the Chairman:*

Q. I understand you are engaged in agricultural pursuits?—Yes.

Q. You have a farm and carry on farming operations?—Yes.

Q. What experience have you in horticulture?—That question is a very broad one. The lines in horticulture to which I have given the most attention are fruit, forest and ornamental trees.

Q. Do you belong to any horticultural society?—Yes; to several of them.

Q. Have you visited the North-West?—I have been in the North-West.

Q. Is tree-planting practicable there?—The North-West is a large country. There is not only a variety of atmosphere there but a great variety as to dryness or moisture. The chief obstacles to tree-planting on the prairies, in Manitoba, for instance, are the cold winters; and in places, the impenetrable clay underneath the thin coating of black loam. You come to totally different difficulties when you get into the Medicine Hat region, where you are on the edge of a cold, dry desert, and there you need trees adapted to cold, dry regions.

Q. Do you believe that tree-planting is possible there?—In Manitoba I never expect to see the same growth of trees that we have in Quebec—that is, trees of the same size for timber uses, but I do not see why there should not be timber grown there for fuel, for shelter and for various other purposes.

Q. Do you think the Government could aid tree-planting in the North-West?—Certainly; and it is absolutely necessary that there should be wind breaks, shelter breaks and fuel there at the earliest possible date.

Q. And to help tree-planting in the North-West, what would you suggest?—The only way in which that can be done, and done rapidly, is by starting testing grounds, where trees of easy culture can be grown, propagated and scattered. I see no other way.

*By Mr. Fisher:*

Q. When you say testing grounds, I suppose you mean in conjunction with propagating nurseries?—Now, for instance, in Manitoba I have often been asked: "What ought I to plant as a wind-break tree." I said: "The white willow." Then came the question: "Where are we to get it." Well, the chances are that the only way to get it is by sending for little cuttings, which come by mail from Minnesota. Now, what we want to do is to carry into that country any quantity of such trees as the white willow, the white silver poplar of Europe, and other trees of that character, which grow rapidly from cuttings. Besides that, we want to go into a series of experiments. We want to know whether the white ash will grow in that country. We want to know also whether the Norway maple will grow there; and the best thing to do is to introduce such trees as are rapid growers and experiment with them.

Q. That would provide quick-growing wind-breaks, which you would get in a very short time, and then I suppose other trees would do for places where rapid growth is not so immediately necessary, or to take the place of the white willow and quick-growing trees, if not found to be so good?—In the North-West the great point is to have trees for shelter and fuel at the earliest possible date. Therefore, we must begin with the white willow, the cotton wood, and the silver poplar of Europe. Then let us start plantations of such trees as ash, Norway spruce and trees of that kind, to come in after the others. But the first question is trees that grow quickly from cuttings.

*By the Chairman :*

Q. You have visited Germany, Russia and some other European countries; is arboriculture successful there?—Yes; Europe looks upon forestry from a different point of view to that at which we look at it in this country. From the large amount of pine that has been planted all through Germany and the careful—not the wasteful—way in which the people use it, pine must before long become an article of export from that country. Then on the immense sand plains of Poland, land fit for nothing, there are immense plantations of pine. To the forests of Germany you may almost apply the term "high culture," or garden culture, because the Government forest shows care in its management, which contrasts strongly with the negligent care of the peasant's lands. When you come into Russia you see the same care in the Government forests. I forget exactly how many Government stations there are, but I think there are some two hundred of them, and as you wander about Russia you continually come across them. There are large plantations of trees, and if there are any woods adjoining them those woods are carefully kept.

Q. What methods have been adopted by the Governments of Germany and Russia towards making arboriculture successful?—The principle that seems to be adopted by these countries is that when land is suited only for the growth of trees the Governments—I do not know whether they buy them—take means to provide that the forest shall produce all it can per acre. That is the idea of the Governments of Europe on that question.

Q. Have you examined into the cultivation of fruit trees in foreign countries?—Yes; we have our drawbacks in the way of fruit culture in the greater part of Canada. We are north of the limits of the successful culture of the fruits of western Europe; and it is only those occasional fruits which have, for some reason or other, some northern blood in them, some northern ancestry, that can be grown in our colder climate. So that we are compelled to go to the old world, and to the cold climates of that world, for our fruits. In this country, besides, we have no native fruits, except the little wild sweet-scented grape, in the North-West, which is not eatable. We have no pear, no plum, and no cherry, except the little black cherry and the choke cherry. We have to go to the old world for our fruits. But the greater part of Canada is north of the limit of the successful growth of those fruits. But, fortunately for us, there is another race of fruits growing in the colder parts of the old world which suit our climate. A year ago, I spent about two months in England, Germany and Russia. We went to the Botanic Gardens and other places of interest to us. The Russians have looked up their forestry and botany, but their fruits they have not looked up. That threw us into the peasants' orchards. We had to wander about among them, and we were in the coldest gardens in the world at the time the fruit was on the trees. We got a pretty good idea of the Russian fruits, though we found nobody in Russia who knew them well. The fact that we found the fruit there brings out the further fact that there are races of fruits, by the introduction of which we can increase the area, North-west, of the apple, pear, plum and cherry on this continent, and that very materially. If you look into my report you will find a table of climates, made out by the Meteorological Office at London. There are some errors in the column headed: "Lowest temperature in last six years." Through that report you will also find the record, as given by the Government, and as given to me by the western stations all through Russia, of the lowest temperature recorded.

Q. Do you think there are more varieties of fruits in Russia than here, and that we can increase our variety by importing fruits from Russia?—They are growing the apple there in great quantities. Now, for instance, take the Government of Kazan, 400 miles east of Moscow, 600 miles further north than this, with the extremes in the matter of climate, a warm summer and dry, steady winter. It is a point to which Crookston, or Fergus Falls, on this continent, would correspond. There we find the apple grown in twelve peasant villages to the value of about $50,000 per annum. The thermometer had been down to forty degrees below zero the winter before we went there, yet the trees were full of apples. The thermometer had been down to fifty-two or fifty-six five years before, and there were no signs of winter killing on those trees. Now, the fruits of that region must be of great value to parts of our North-West. I do not want to be too sanguine about the North-West. I hope we can grow fruit there; but we are going to fail in some of our first attempts, because we do not know how to grow it there. As I say, those fruits that are growing in climates so much colder than our own ought to be introduced there. Then, as regards the pear: I saw pear trees at Saratof, where the winter temperature is one degree milder than at Quebec, and they were in good health. Then, when you come to the cherry: in the district of Vladimer, just east of Moscow and a little north of it, where the winter temperature is three degrees lower than it is at Quebec, they grow a cherry in such quantities that full cars of it and, at times, entire trains of it are shipped; at all events, it floods all the markets, and yet the winter temperature of the climate in which it grows is much lower than that of Quebec. That brings up the query whether such fruit should not be introduced into Canada, not for limited trial, but for something more than limited trial; because if we had it, it would lead to another industry, that of canning the fruit, which would be well worth having. There are plums grown in these regions of the German prune type, of good quality. At the same time, whether they or an improved variety of the wild plum of the North-West will be the plum of the future for us, is a question. There are still other fruits grown there that we can grow; for instance, take the mulberry. There is a Russian mulberry that has been introduced into this climate already; it is possibly of some use, but do not let us take all that is said of it for granted. At any rate, there are mulberries in Mongolia, Central Asia, growing in colder regions than those in which the Russian mulberry is found. There are also mulberries of fine quality growing in Amur, on the Pacific Coast, so that we should increase the area of growth of that fruit. Then we come to the apricot. The apricot is growing on the Altai Mountains, between Turkestan and Southern Siberia, at a high elevation and in a cold climate. They are only medium in size, but of good quality. They are growing on the edge of the desert. When it comes to peaches, I do not know of any peach that can be grown in a climate like that of Montreal. We can, by the introduction of the Chinese peach, get varities that will grow to a certain extent north of the point in Canada at which they grow now, but not in the cold Lower Canadian climate. Still, judging by the Russian fruits we have seen and tested, we know we can, in the climate we have, increase the area northward of the fruit culture on this continent.

*By Mr. Foster:*

Q. You have spoken in regard to temperature; is there a similarity of conditions in Canada and Russia as to winds?—Russia is a huge continent and a flat continent. St. Petersburgh has a Gaspé climate; Moscow a little more of an interior climate; Kazan a Steppe climate. I do not think the winds at Kazan are as high as at Winnipeg; but they have a rainfall at Kazan less than half that of Montreal. It is a dry climate; but it has not the winds of the North-West.

*By Mr. Fisher:*

Q. How does the rainfall at Kazan compare with the North West rainfall?—I could not tell you the Medicine Hat rainfall just now.

*By Mr. Foster:*

Q. What is the quality of the Russian apples you have spoken of?—They vary a great deal in quality, but there are very few sour in them. The Russian does not like sour apples, and I suppose sugar is a little dear to buy. There are no apples that beat the Fameuse, but there are some of really good quality.

Q. They make a serviceable and useful fruit?—Certainly.

*By Mr. Fisher:*

Q. Will they average as high as the fruits we grow here now, as far as quality is concerned?—If you except the Fameuse and the St. Lawrence, there are no market apples in Lower Canada that are of first quality; and if you take out the Spitzenberg and the Gravenstein, there are no apples grown in Ontario for market purposes of first quality. You must remember that the great market fruits of the world are never the fruits of the highest quality.

Q. Do you think the Russian fruit would average as well as our Canadian fruit?—Certainly.

*By Mr. Foster:*

Q. What do they do with the mulberry?—I was not in the mulberry growing districts. The Russian mulberry that grows in this country is not the fruit of that name that grows in the far north. It is a big tree at Odessa, and the Mennonites, who brought it out, brought it from the Sea of Azof, on the Black Sea. We did not go into that climate; we kept in the cold climate.

*By the Chairman:*

Q. Is fruit culture lucrative in Canada?—My own orchard is a young one. If I answer that question, then I must give the opinion of other people rather than my own. I have a neighbor, Mr. Cotton Fish. We got him to make an estimate of what his orchard had cost him, and an estimate of the amount he had received in cash from it last year. He began by saying that the great mistake he had made in his orchard was that he began before the time when we were looking into kinds for profit. He therefore transferred all he could not sell in his nursery to his orchard, and he got an awful mixture. Some of his trees were productive and some were not. Then he planted on land that was stony and worth not more than $20 an acre. In that way his investment per acre was small; the amount of capital invested was small, but his estimate was that he had averaged for a certain number of years 75 per cent. on his investment.

Q. Counting the labor?—I suppose so. I forget his exact figures, but they were put on record in the Montreal Horticultural Society's report, a few years ago.

*By Mr. Fisher:*

Q. I think that was the net profit?—Yes.

Q. I think it would be fair to say that his investment was unusually small, and that as he used trees he could not otherwise dispose of, the circumstances were usually favorable to him?—Oh, yes; he planted a good deal of absolute rubbish that produced very little; but inasmuch as he took his own trees out of his own nursery and put them in there, he secured a return of 75 per cent. on his investment.

*By the Chairman:*

Q. How does our cultivation of fruit compare with that of foreign countries?—I think our average culture is fully up to that of other countries. We get hold of books by Battel and others, and we find the most marvellous artistic work in grafting, and we think from that, that that is the general state of present culture, but it is far from the case. You find the most slovenly culture, both in Germany and in France. I think our culture, though it is far from what it should be, is well up to the average of European culture.

*By Mr. Fisher:*

Q. I supposed if you were to compare it with the culture of the Government stations in Germany and in France, it would be inferior?—The Government stations are beautifully kept in some places. All through Wurtemburg, to the Government forests, the words "garden culture" or "high culture" would apply with the greatest truth.

*By Mr. Foster:*

Q. Do the Governments go in for fruit culture?—Except at their experimental stations, where they test very largely the fruit for their localities.

*By the Chairman:*

Q. Do you believe that these experimental stations help to increase the production of fruit or to improve the quality?—They have been almost the only means of doing anything of that kind in those countries. The average peasant in Europe does not see as much as we do. He has not any wide ideas outside of his own immediate neighborhood, and unless he has some advantage near at hand, in the form of a Government station, he has nothing to learn from. It may be that his forefathers have grown a certain apple; for that reason, and for that alone, he continues to grow it; and the botanic garden is the only teacher he has.

*By Mr. Fisher:*

Q. In continental nations people look more to the Government than to private enterprise for instruction, do they not?—I said the Government stations were the only advantage the peasants have. I should add that they have innumerable little branches in this way. In Germany there is a law requiring all the district school teachers to attend one of the entomological schools, and to spend three days there at a certain period each year. They hear lectures and take up certain kinds of work. When they go back to their schools they have a certain piece of ground which they keep, and by its aid they give instruction to the students in horticulture. That is the way in which Germany has kept the idea of horticulture and fruit culture before the people.

*By the Chairman:*

Q. Did you see a great many of those botanic gardens?—As we went through Europe we took in all the botanic gardens we could in climates not too mild. We went to the forest school at Nancy, to the entomological school of Dr. Lucas, at Wurtemburg. We went through Northern Austria and Northern Germany. These botanic gardens vary very much in the character of the work they do. Some remind me of a geological museum. In a geological museum we find specimens of all the rocks, from the Laurentian to the recent. In some of these botanic gardens we find specimens of every known tree; and these trees are placed there in order to see whether they will stand the climate or not. Then, again, some of these stations have gone beyond that. They go in for experiments with all sorts of forest trees and ornamental trees, and for the propagation and scattering of those that will live in that climate.

Q. Do you think they have good results?—They are based on this fact, that in any given country we find a very small porportion of the plant life that will grow in that country. For instance, here we have no native tree fruits except our choke cherries and our wild plums; but we find that we can grow all sorts of fruits from similar regions in the old world. You take any given part of this world and you find that only a small amount of the products grows on it. But by bringing from all other similar climates in the world the fruits that grow in those similar climates we can increase the fruits of the climate ten times over.

Q. Do you find botanic gardens in every British colony?—There is one curious point when you come to think of that. If you take up the reports of the botanic gardens you will find that they have large botanic gardens, stocked with every kind of plant that can be produced in the tropical climates, in all the British colonies. Let me speak a little more particularly on that point. If you go to Europe you find that every European Government has spent large sums in the establishment of botanic gardens. When you go to the Tropics you find that the different Australian colonies, Melbourne, Brisbane, Adelaide, all have their botanic gardens. New Zealand has three or four; Tasmania has two; Mauritius has one. At the Cape there are two. In India there are a lot of them, with one central station at Saharranapore. In the West Indies they have three specially large stations, one in Jamaica, one at Demarara and one at Trinidad, with other smaller stations. The East and West Indies have been interchanging their products for over a hundred years. I would like to take as one sample the Island of Jamaica. Their botanic gardens were started a hundred years ago by the capture of a prize ship from the East Indies going to some other colonies. This vessel contained various plants. These plants were planted out. In time the number of stations increased, and now there are eight of them. The island is 150 or 180 miles long. It has a low-lying, but rising sea shore, where they grow all kinds of cocoanuts. Then when you get up the mountains, you find different products. There you find in the different climates grades of oranges, coffees, cocoas and the chincona from which you get quinine. The result is that numbers of fruits are grown there, and now steamers are going to all the different ports around Jamaica picking up a cargo almost anywhere and carrying it off to New York. Such has been the effect of the experimental station on the fruit trade of the tropics. Now, take the chincona, that is the quinine, the first they had could be grown between the fourth and fifth, but now they have another, which instead of selling at 2s. 6d. sells at 7s. 6d. per lb. Then they have some which will grow down two thousand feet lower on the mountains. Then there is the coffee area; that is limited. But they introduced the Liberian coffee, which will grow nearer the sea shore. They have also introduced other things, and the curious thing about the fruit trade of that island is, that hardly any of it is a trade in any kind of native product. If we get into a country trees specially adapted to it, they will grow with very little care, and so it will be with this apple question, though if you introduce an apple, it may want at first a little nursing. The work of the most value to us here in Canada—except in the milder portions of Ontario—is the work being carried on at the State Agricultural College at Ames, Iowa. The work that is being done there is simply this. Varieties are imported by that experimental station. As they are imported they are propagated and sold at a small rate, to those who specially want them and are likely to take care of them. Then the place is run as a nursery in another way. All you want to do is to get those things that are not in the market, and to scatter them at a reasonable rate, which tends towards starting them; the moment these things are grown in the country and can be got elsewhere they drop them. But the idea is to scatter them. That is the kind of work that I would like to see done here at Ottawa, or some central point.

*By the Chairman :*

Q. How could the Government bring about a better system of cultivation of fruit trees ?—I do not consider that our great lack in the greater part of Canada is lack of culture ; it is more a lack of varieties that we can grow in our cold regions, or in unfavorable localities in the wild regions. Now, for instance, we in Montreal are on the extreme northern limit of the growth of Fameuse. If you go to Newport, on Lake Memphramagog, you will come to a climate colder than that of Montreal, that cannot grow the Fameuse, though we can grow them at Montreal ; it is only the temperate parts that can grow it. Now, what we want to do is to supply the localities that cannot grow it with trees they can grow.

Q. What plan would you suggest to secure that ? Do you think the Government should establish an experimental station or an experimental garden ?—Suppose we had something of that kind started here, we would not need more than ten acres of ground, but it would be safe to have ten acres alongside, which we could get if we wanted to make the station twenty acres. Then we would need to import certain trees, some from Russia, some from Northern China, and some that we could get from Ames, Iowa ; that is, we should import them from cold climates. We should propagate these enough to get them scattered in the country. Then for the experimental orchard, we should have three trees of each kind planted in it. That is not an expensive work, and the great beauty of the thing is that we know now what to import. We are not working in the dark now ; we know what to import, and we know that our work is one of certain success. Another branch I would like to see is a forestry branch in connection with it. Why should not we import for trial certain varieties of forest trees ? You may propagate them to scatter in a small way. At any rate I would like to see a trial timber plantation, with the different varieties of timber suited to this climate grown side by side, to test their comparative value.

*By Mr. Irvine :*

Q. Do you grow the Duchess of Oldenburg in Quebec ?—Yes.

Q. Is it hardy ?—Yes ; it does well with us.

Q. It is a tree which grows in New Brunswick, even in localities where the thermometer goes down to forty below zero ?—It is a most valuable tree. It is worth everything to us. We found apples on the Volga just like the Duchess, that we could not tell from the Duchess—a nice apple, with a little sub-acid and a mixture of sweet. I am looking for varieties of the Duchess.

Q. The Duchess is only a fall apple; we can keep them till 1st of January by taking pains with them. Have you discovered a good winter fruit?—There are a great many winter fruits. One thing I am most dogmatic upon is the keeping of fruits. In Russia they keep them better than we do.

Q. Do you know anything of the Wealthy?—It is the most valuable winter apple for the colder sections of our country that I know.

Q. Did it not come from Russia first?—No; it was a seed that came from Maine. What the parentage of it is, is a question. Mr. Gideon declares it is from a crab, but others doubt that.

*By Mr. Fisher:*

Q. Would the forming of experimental stations bring in such returns to the country as to justify the necessary expenditure?—Well, no other Government has looked upon this matter as a question of expense at all; they have looked upon it as an investment. We are singularly alone in having no experimental stations. All the other colonies—small colonies all through the Tropics—and not only these, but other countries, follow the example of the early Dutch and Portuguese colonists in starting botanic gardens wherever they start a colony, to see what will grow in the place.

Q. I would like to know whether you think the expense would be justified by the return?—It is a matter of very small expense. It would probably be a division, or a section, or a department of some larger work. As I say, we need from ten to twenty acres of ground. Of course, if you are having an experimental station you want one good, scientific man at the head of it. As far as the fruit and forest trees are concerned you want a good gardener, a man who is a good propagator, and under him occasional labor. It is not a matter of great expense. It is not the expense of a department of any of our agricultural colleges.

*By the Chairman:*

Q. What experience have you in the planting of forest trees?—In the planting of forest trees I commenced a little test timber plantation seven years ago. I planted out about a thousand trees. I planted our own white pine alongside the Scotch, our own tamarac alongside the ash and the Norway maple, our own spruce alongside the Norway spruce, and so on. Then I planted European white birch, white cherry, cotton wood, silver poplar, and so on. I would like to see a similar plantation here on an experimental station if it were established. My own plantation is beginning to show many interesting points. For instance, I have birch and Norway spruce planted together, but my Norway spruce are only two or three feet high, and will never grow any more, because the European white birch grows so fast that it is crowding them out and killing them. There are many very interesting points that can be seen with the eye on a plantation of that kind, and I would strongly suggest that something of that kind be started here.

*By Mr. Foster:*

Q. What is the plan adopted by the European Governments regarding forestry stations—take, for instance, Russia. You say they get possession of land for that and nothing else; then, how do they proceed?—The planting of these forests is different in different climates. In Germany, for instance, the great tree is what we call the Scotch pine. There is one good that has been developed as a result of these experimental stations. Western Europe now no more plants its own silver streak, but it plants instead Riga pine. This is perfectly straight in its trunk, and it is found to be a little tougher, more elastic, and a better grower. In Germany, where the climate is a little moist and the sun not so hot as on the Steppes of Russia, they plant their trees as close as they can, and as they grow, thin them out. They are so easy to grow and the plants so cheap. On the other hand, in Russia, where the winds are dry and it is more difficult to plant, they plant their trees eight feet apart each way, and then keep the side branches cut off until they get a certain height. But then the Russian Government works the Russian forests; it takes the forests under its care. The Department of Public Domains gave me figures regarding the forests they have, and I find they made out of them a profit of 2,000,000 roubles during the year. They have 752 forest stations scattered about.

Q. What is their source of revenue?—The sale of timber.

Q. Simply that?—I believe so.

*By Mr. Fisher:*

Q. I suppose in the German forest stations, where they plant their trees so closely, they thin them out at such ages that they can use the timber; they allow the trees to grow to a certain size and then take them out and use them for the different purposes that small timber will do for; then, after a certain number of years, they take out another class of timber, and so on?—Yes; in Germany they plant so closely that they have to cut out a large amount of stuff that is perfectly useless.

Q. But do they not, as they thin them out, take out much that is merchantable?—Yes; they set a value in Germany on small pieces of wood that we would not set any value upon at all. You asked me, some little time ago, about trees for the North-West, and I spoke of the silver poplar. That is a tree thoroughly adapted to the north. The wood is the best of all the poplars, but you cannot get a straight stick of any length. Now, at the botanic garden at Kazan, on the Volga, there are about fifteen trees growing in a single row—not growing close together, so as to cause straightness of trunk. These trees maintain a perfectly straight trunk, like the mast of a vessel, with no kind of wabbling or deviation. The tree grows in a dry soil, from cuttings, and will stand the coldest winters. The wood is of good quality. It is not so fast a grower as our Canadian wood, but still it is a fast grower. I think that tree is going to be of very great value to our North-West.

*By Mr. Foster:*

Q. Suppose the Government established one experimental station of the kind you speak of, what would be the best site for it, so that the results we would get from it would be applicable to the largest area?—You want to pick a middle climate—not a Niagara climate, not a Winnipeg climate, but something between the two. The idea, it seems to me, the Government should follow out, would be to get as many branches as possible. Now, the Iowa Horticultural Society has eight different little experimental stations in connection with one large central station. Minnesota has established about eight. I know one is at Fergus Falls and one is at Crookstown; and these are going to be of the greatest use possible to us in determining what we will grow in the North-West. Then take Jamaica; it has eight or ten Government plantations; the Government has bought land here and there and has planted it with specimens of chincona, oranges, cocoa and so on. I think you will find that the different Provinces would only be too ready to take up something of that kind, and more than that, they would support little branches.

Q. Where do you think would be the best site for a central experimental station?—I do not see why it could not be at Ottawa if you have good grounds here. You must have them near, so that people could go to them; you do not want to have them miles away from a city.

*By Mr. Massue:*

Q. How many acres would be required for the station?—I do not think we would need more than ten to begin with, but I would like to have ten alongside that could be acquired if necessary.

*By the Chairman:*

Q. Would the establishment of a Central Bureau, having for its object the collection of information upon all matters relating to agriculture and having a skilled staff capable of giving advice, making experiments, and noting the improvements effected in other countries that might be advantageously introduced into the Dominion, be a benefit to our agriculturists?—Yes; that is the very thing we want; but it depends upon what your Central Bureau is composed of. The one fault, the tendency to failure, and the one thing we have to guard against is, having men to carry out this matter who are political men. They should be themselves horticulturists. Now, there have been men as Commissioners of Agriculture at Washington who knew nothing, positively, about trees. That was too bad, and that is one thing we have to guard against.

*By Mr. Foster:*

Q. Would the man who knew the most about trees be the best man to be Commissioner?—The question of Commissioner I would not go into, but you must have for governing men, in such a case, men who are horticulturists. Ontario came to that conclusion some time ago, and the Government has put the Horticultural Department of the Guelph College under the charge of a Committee of three members of the Horticultural Society of Ontario. It has gone thoroughly into this thing. Now we are getting the best of the Russian fruits in by degrees. We have a number of little horticultural societies doing a great work in a little way. But here is a greater work to be done. We know those fruits to be existing. Our country, above or beyond a certain latitude, is pretty much without fruits. We have no machinery to carry fruit culture north-west to its extremest limits. Our local horticultural societies are doing good, but they cannot do that. We want machinery—machinery such as the States of Iowa and Minnesota have—for doing that work.

*By Mr. Foster:*

Q. How would you propose to get that machinery?—Simply, as I said before—something in the way of a testing ground. I do not like the term botanic garden; farmers do not like it; they think it is scientific nonsense; but some of the best experimental stations in the world are called botanic gardens.

*By Mr. Fisher:*

Q. As I understand your idea, it is that we should have an experimental station, also a propagating ground, from which large quantities of trees which are found by experiment, either in that garden or elsewhere, to be suitable, can be sent out into the country, either free or by charge, as the case may be—that is a matter of detail—so that there may be supplied to our agriculturists varieties that they could not otherwise get?—That is my idea exactly.

*By the Chairman:*

Q. Would the dissemination of handbooks about horticulture have a beneficial effect?—Yes; we want to know points about culture. There are many things that could be made known in that way. But the primary fact to get hold of is to raise all trees that will grow in our own climate.

*By Mr Foster:*

Q. If you had a testing ground and found out what was best and most suitable, could not those be imported in quantities direct from the countries in which they are grown?—There are a great many little troubles there. I know there were a few things that I and Mr. Budd, of Ames, Iowa, wanted to get from Russia in quantities, but fifty scions or twenty-five scions were all we could get. Sometimes propagators are not orchardists, and they could only give us the most limited quantities.

*By Mr. McDougald:*

Q. How do they send them?—By express; sometimes they are packed well and we get them all right, but sometimes it is the other way. To my mind, a very valuable race of trees are the Siberian poplars. They cost nothing to import and when you have them here you can propagate them to any quantity. Probably, if we had a few of those sent here we would find them very desirable.

*By the Chairman:*

Q. Is the importation of fruit trees into the country expensive?—No; you pay ordinarily for a tree what you do in this country, and the expressage is not heavy.

Q. Do you believe that a large loss is suffered, generally speaking, by our agricultural classes, on account of the want or insufficiency of agricultural knowledge on the part of many of our farmers?—Yes; but I hardly know how to answer that—

Q. Do you believe that a Bureau of Agriculture established in Ottawa here would remedy, to a great extent, many of the deficiencies in our present system of agriculture?—I do not wish to urge too many things; but I do wish to urge these two questions, experiments in fruits and in forestry.

*By Mr. Fisher:*

Q. I suppose, in those experimental stations, experiments could also be made in the propagation of farm seeds, in potatoes and cereals of different kinds, and probably by the same scientific observers as conduct the experiments in fruit growing and tree propagation; also, if it is considered advisable, experiments in butter and cheese making could be carried on in the same establishment and under the same general management; thus you would have distinct branches of one large subject?—Yes; there could be branches looking to almost everything. Regarding that question of wheats, I would like to say a word. We saw very fine wheat in Poland, and when we were at Sawara on the Volga, which is just on the edge of the cold dry desert, the camels were bringing in loads of it. It seems to me that if we want to grow wheat in the Medicine Hat region we ought to import this Sawara wheat.

*By Mr. Landry (Montmagny):*

Q. What are the industries that can be established in connection with fruit growing?—The general culture of fruits throughout the country. Of course, fruit began by being cultivated for home use; the moment a farmer finds he can not only grow it for home use but for the market, he becomes a commercial orchardist.

Q. What other industry would be encouraged here by the production of fruits?—Well, there are many questions that come up there. Now suppose we had a district in this Dominion like the district of Vladimer, in Ruusia, where cherries grow in tremendous quantities, and where the whole cultivation by the community is that of the cherry, we would soon have drying establishments and canning establishments, and the result would be a very large export trade. If we had a Province of Valdimer here in Canada, we would be shipping immense quantities of fruit to England.

Q. What do you think of cider making?—I do not know anything about it, really.

Q. What are the insects most injurious to fruits?—The worst of all insects, as far as the apple is concerned, is the coddling moth.

*By the Chairman:*

Q. Is the beet sugar industry carried on in Russia?—Yes; when we were going through Central Russia, that is the black lands of Russia, the prairie district of Russia, here and there we would come across a few thousand acres of beets, and in the centre a large factory with a big chimney, evidently a sugar factory. I understand that all the sugar in Russia, except a little cane sugar in St. Petersburg, is made there. The sugar is white and hard, and the curious point is that they are not up to making inferior sugar of the refuse. The result is that the refuse is exported to Germany and France, and only first-class sugar is made in Russia.

*By Mr. Foster:*

Q. Is the sugar beet raising done in Russia under the same climatic conditions as in Canada?—Yes; but they are growing it in countries more like Iowa, Illinois, Wisconsin, and in rich, deep, prairie soil, mostly.

*By Mr. Massue:*

Q. What kind of prairie trees would you recommend to be planted in the country?—We can increase the number of our aromatic trees very largely. I think I have between a hundred and a hundred and twenty varieties growing at Abbotsford. There are quite a number of maples that are interesting. My favourite tree is the cut-leaved European white birch. I think it is the most feathery and graceful ornamental tree we have.

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**Prof. Arnold**, of Rochester, New York, called and examined:

*By the Chairman:*

Q. Would you tell us your experience in butter and cheese making?—I could not tell you the whole of it just now, it is so long. I have been in the business about all my life.

Q. By your experience, what are the deficiencies in butter and cheese making in Canada?—They are numerous; they are not alike in the different branches. If we take cheese, the obstacles in the way of success are, first, a want of skill on the part of manufacturers, and in the second place, a deficiency in the quality of rennet.

Q. Are these all the deficiencies you can remember?—No; there are a hundred, but those are the leading ones. There are a great many defects: in the quality of milk, in the care of milk, and in the handling of it in the making of cheese. Then there is an undue cost of production. One of the defects occurs with the dairymen themselves, and it consists of making the milk cost more than it should.

Q. How is that?—In the first place, they do not take proper care of their cows. In the winter they allow them to be exposed to cold, and it takes a great deal more food than otherwise would be necessary to sustain them. That makes the milk expensive. Then the cows are not sufficiently provided with comfortable buildings to protect them. Then they are not sufficiently fed. Dairymen think that if they feed enough to keep their cows alive that is all that is necessary. But more is needed. They need to store up in the winter a stock of health and flesh to be utilized in the summer. There is generally a sufficient food supply while the grass is fresh and green, but in the latter part of the season, or in the middle of the season, when the food begins to dry up, if there is not an extra supply furnished to supplement the pastures, so that they get enough, they shrink in their milk. I have taken pains to explain the reason of this, so as to induce farmers to do better. I have even gone into the physiological question, in order to show them how this scanty feeding operates upon a cow.

Q. Do you think the farmers make mistakes in choosing breeds for milk purposes?—Not so much in the breeds as they do in failing to select the best animals that they keep. They keep a great many that are not valuable, because they are unproductive. Now, in central New York, for instance, where cheese making is the principal business of the dairymen, it is estimated by good judges—persons familiar with the matter, being in the business—that all the profit made by dairying in that section is made from one-third of the cows kept, and that two-thirds of the cows yield no profit. One-third is kept at an absolute loss; the middle third, so to speak, just about pay their way, while the remaining third pays the profit. That difficulty, I find, arises largely from the improper selection of dairy stock.

Q. You spoke, a few minutes ago, about the deficiencies in cheese making; what deficiencies have you noticed in butter making, chiefly?—The deficiencies in butter making arise chiefly in the care of the milk and in the manipulation or making of the butter. The milk is generally in very good condition when it is drawn from the cow; the difficulties in butter making come in after that—in setting the milk to obtain the cream, and in the manipulation or making of the butter.

Q. Do you think very heavy monetary loss is suffered by Canadian farmers on account of the inferior quality of the butter made?—Yes; a very heavy loss indeed.

Q. I see that in Ontario a member has said that Canada is losing from $3,000,000 to $4,000,000 a year; do you think that that estimate is excessive?—No; I put it at $5,000,000; I think you lose fully $5,000,000 annually in defective manufacturing.

Q. Of butter alone?—Of butter alone.

Q. What steps should be taken by the Government, in your opinion, to disseminate useful information about butter and cheese making?—Perhaps as good a way as any is to give personal instruction. There are a good many ways in which the Government might facilitate the spread of the knowledge of the art. Now, in Denmark the Government supports a professor at the Royal Agriculture College, Copenhagen, and besides his duties as lecturer at the college, he spends a portion of his time every year going about the country from farm to farm. He does it in this way: He sends to some leading farmer and advises him that he will be at his house at a certain time, that he will stay two weeks and make butter and cheese there, and that all the neighbouring dairymen, dairymaids or dairylads, as the case may be, who want to learn to make butter and cheese can come there and question him, and see him work practically. In that way he gives practical instruction in the work, and those who attend his classes become quite experts. Then he goes to another centre for a time, and so he goes on repeating the instructions during a considerable part of the year. In that way he puts the industry ahead very rapidly. That is one method. In Ontario the Government furnishes money to the dairymen's associations, to be expended by them in employing instructors and in other ways to distribute knowledge. Last year there were four instructors employed in giving instructions to cheese makers all summer. Three of them were paid by the Government and one by the convention. In that way they have put ahead the cheese industry very rapidly. The same might be done for butter making. Model creameries would be most excellent things to be instituted in the different Provinces, and the Government might employ teachers to go directly wherever they are called for. In Denmark a good deal of attention has been paid to new apparatus for handling milk, cream and butter. This apparatus was very defective; but the Government has paid men for constructing new machinery for butter making, with very advantageous results. The more you can do with machinery the better. The further removed the thing is from the necessary skill and judgment on the part of manufacturers, the better they get along. Let the thing be done by apparatus rather than by attempting to educate the makers into the intricacies of the art, because so many will lack judgment. They can make by rule if they have the rule, easier than they can make when so much depends upon skilful manipulation.

Q. Would a system of inspecting and branding butter and cheese stimulate producers to greater exertions and augment the value of the product in foreign markets?—I do not know. I hardly think it would amount to much. It certainly would do no harm and it might do some good. But an inspection of butter to-day would not be worth anything for to-morrow or a short time afterwards, butter changes so rapidly. With cheese it might have some benefit, but cheese is all the time varying and an inspection of it cannot last for long.

Q. Is Canadian butter bringing a lower price on the English market than the American butter?—No; I think not, and for the reason that the butter you export is mostly of your best grades. You export better butter than we do; our good butter is all consumed at home and we only export the very lowest grades. We never export anything above 22 cents, even when butter is high, and from that down. Our best butter is all taken up at high figures at home.

Q. Would you favor the establishment of creameries throughout the Dominion?—They are a very good thing. They are the stepping stone to what ought to be, and what probably will be in the future. They are a very convenient means of educating people to a certain extent in the art of butter-making. Creameries are very successful on our side, not that they make better butter than can be made in the private dairy or on the farm, but they make a uniform quality, and that goes a great way towards marketing it. Now, where there is a sparse population creameries are quite advantageous, because they bring the butter all into a centre where it can be sold to the best advantage. If a man wants to buy butter he cannot afford to travel from farm to farm and pick up samples, at a great distance, that would after all be unliked when he gets them. It costs too much. But if he can go to a creamery and buy a thousand pounds at one purchase, he can afford to pay 4 or 5 cents a pound more for it than if he had to travel round and get it, while the fact that the butter is all of one quality will add another 4 or 5 cents to it. So that it is more profitable to make creamery butter than dairy butter, as a rule. But creameries will never take the place of private dairying in the older settled portions of the country where the taste for butter is more aesthetic and where the facilties and the skill for making butter are more complete. The dairies, as a rule, make better butter than do the creameries, but then the creamery does not divide the proceeds equally. They count the milk by the pound. Now it happens that some milk is worth a great deal more than other milk. The man who feeds his cows and can produce a very rich quality of milk should get a great deal more for his milk than the man whose cows are only partially fed. But the system of purchasing both qualities is the same, consequently the poor milk gets more than its due and the good milk fails to get its due. This inequality will always work against the creameries, that is, where people have the skill to manufacture for themselves. Creameries on our side are the most prosperous and seem to be doing the best business and to be giving the greatest satisfaction in the west where butter making is just being introduced. In the east they are not so much in vogue. There, dairymen prefer to keep their milk at home and to make it up themselves, because they get more from it.

*By Mr. Landry :*

Q. Does not that inequality extend to cheese making?—Yes, Sir; there is the same inequality in the division of the difference, but the difference is not so great in cheese making as it is in butter making. The widest difference is in what is called the cream gathering system. This is very one sided. Cream varies a great deal more in quality than milk does. It has been shown by chemical analysis, that one sample of a given weight of cream may contain three times as much butter as another. Now, in the cream gathering system, on an average, they find that seven cubic inches of cream make one ounce of butter. The exact measure, they estimate, is $7\frac{1}{16}$ inches. Thus, 113 cubic inches of cream are calculated to make a pound of butter. Take a large amount of cream together, it averages that amount. In a recent test, where samples of each patron's cream were churned separately, it was found that, on an average, 113 cubic inches came very near making just one pound of butter. There was just two pounds difference in several hundred pounds of cream. But one patron's cream made twenty-four ounces, instead of sixteen, while another patron's made only eight. The majority made less than one pound; five, out of twenty samples, made just one pound, and the rest made up the difference. It made a very unequal division, as amongst the patrons and such a state of things will be tolerated only where there is no other resort for making butter.

Q. A few minutes ago you spoke about pasture not being very good at the end of the season; can you suggest anything to improve those pastures?—Yes; the better way is to supply the deficiency with food raised outside of the pasture, to cultivate corn, peas, oats, millett, green corn or some succulent food to supply the defect. The pastures are not so much at fault as the weather. Any pasture will dry up in the middle of the season where you have a long dry summer. You are not troubled so much with that as we are. You have more rain in the summer than we have, and you do not experience any difficulty whatever in that respect in some portions of Canada. In the northern portions I have noticed that the grass remains fresh and green all summer. With us it gets very dry, especially in the west, where the middle of the season is dry for a long time, and the cattle suffer for the want of both food and drink. When once the cattle run down in consequence of this the quantity of milk is reduced, and they will not recover their former flow of milk, even if you supply them with the food afterwards.

Q. Is it possible to have anything like permanent pastures?—You can have permanent pastures, a great many dairymen do have them, but they will be subject to the fluctuations of the weather. The more moisture you have up to a certain extent, the fresher your feed will be; but when it becomes very dry, there is no ground that will not give way after a while, and the feed will fail. I do not know exactly though what you have reference to in permanent pastures; whether you mean a continuous supply of feed from one piece of land, or a piece of land remaining permanently in pasture.

Q. I mean keeping the pasture up by means of different kinds of grass. I understand that in Denmark there are different kinds of grasses that will grow at different times during the summer?—Yes; you can lengthen out the fresh food in that way. Some grasses mature early, and some mature late, and by varying the periods of sowing on the pasture field you can add very much to the length of fresh grazing. In Holland they have little or no difficulty in keeping fresh feed all the summer; the nature of their soil is such, and they have such an abundant supply of moisture, they can brave the summer there pretty well. In this country we cannot do that, except in some special localities.

Q. Would you favor the distribution of handbooks on butter-making?—It would be a capital idea if you can get the people to take them and read them. I think the movement of the Provincial Government of Ontario in distributing the handbooks it has sent out has been a very good one.

*By Mr. Benoit :*

Q. Is it more profitable for farmers around great cities, such as Boston or New York, to sell their milk than to make it into butter or cheese?—There is not much difference. The cost of producing milk in those localities is so high that the producers do not make money. The farmers in the country, of course, have the advantage of raising their own feed, which they get at the bare cost of production. Those who produce milk near the cities, for the cities, on the other hand, have to buy the feed upon which some one has already made a profit. The farmers do not sell feed at what it costs; they usually sell it at 100 per cent. more than it costs. The man who buys it has to pay that profit and, as a consequence, it cuts down his profits.

Q. I understand milk is brought from a considerable distance into New York, and there are special trains for sending the milk into market?—There is considerable milk sent in from a distance, but they have to pay freight upon it. Thus the producer has to pay two or three profits before the milk can be disposed of, and that cuts down his returns.

Q. Do you consider it would pay farmers better to manufacture their own milk than to sell it in the great cities?—Generally.

Q. Can you tell us how they sell their milk?—They sell it tin vessels.

Q. Are they specially made for that purpose?—Yes.

Q. Is there anything new in that line?—Nothing specially new. The cans usually hold forty quarts and they fill them perfectly full, so that there shall be no jumping of the milk to injure it. These cans are carried on refrigerator cars to keep the milk cool.

Q. How far can they send it?—Three hundred miles.

*By Mr. McDougald:*

Q. You spoke about the deficiency in the character of the rennet in cheese making; can you suggest anything to overcome that?—We have made an effort to overcome it, but it is slow to be introduced. We furnish a number of establishments with liquid pepsine. It is perfectly pure and is free from any other animal matter than the pepsine. It is distributed by the quart or the gallon to the dairymen, as they prefer it. In the preparation of rennet, manufacturers are apt to get it tainted. It will get actually into a state of putrefaction, in which condition it will injure the quality of the cheese very materially. You must know that the soakings of a calves stomach in a state of puterfaction mixed with food would prevent it from staying good very long. You would be surprised to see the stuff some dairymen use in Canada and the States. The four instructors I spoke of reported to me a little while ago that they found 75 per cent. of the factories they had visited using rennet that was actually putrid, while the remaining quarter were using good material or rennet extract. The extract costs a little more than the raw stomach, and for that reason is slow to introduce.

Q. Is it prepared from the stomach?—Yes; it is prepared directly from the calve's stomach.

*By the Chairman:*

Q. Is there a very large difference in the prices of good and poor cheese?—Yes; the difference in price, however, is not equal to the difference in merit. Poor cheese is sold much dearer, in fact it is often sold above its merits, while the price of the other falls below its merits.

Q. Is not our Canadian cheese considered valuable on the English market?—Very good.

Q. But still it might be improved?—Very much; there is not 10 per cent., there is not 5 per cent. that is up to its possibilities.

Q. Very often we get cheese which is a little sour; what is the cause of the sourness?—There may be a number of causes for that; but the main cause is letting the curd lie in the whey while it is hardening, until the whey gets sour, and thus leaving all the sugar that remains in the curd in a sour state. The acid then counteracts the effect of the rennet which cures the cheese, and as a consequence the cheese does not cure. If the rennet was not injured by being subjected to so much acid it would cure the cheese sooner, and in doing that it would decompose the acid; but the cheese is not cured and it finally becomes alkaline.

Q. Is there any suggestion which you can make, by the adoption of which the Government might secure an improvement in the quality of cheese?—If the Government saw fit to do it, it could put money into the hands of the dairymen's association, and let them pay in part for the extract, so that the dairymen could get it as cheaply as they can get the rennet. The dairymen, if they had their choice, would take the extract in preference to the rennet, because it saves them a good deal of labor, and is not such a nasty mess to handle as the rennet is. By giving a little bonus in that way the extract could be made here and introduced; and, when once the farmers used it, they will not use the other again. It cannot now be furnished as cheaply as the raw rennet. That seems to be the idea that strikes me, but it may be out of place to mention it.

*By Mr. Benoit:*

Q. I would like to have your opinion upon the creameries, combined with skim cheese; what do you think of that process?—The most profitable way of working up the milk is to make part cheese and part butter. That is the way they do in Denmark altogether. They scarcely make any whole milk cheese. They set their milk and skim off perhaps three-quarters of the cream that rises first. That makes a splendid article of butter, and that is one of the reasons for the extraordinary quality of the butter they send away. They only use the cream that rises first, and the first cream is the best. The remainder they make up into skim cheese for their own use.

Q. For market or for their own private use?—Mostly for consumption in the country. I do not think they export much cheese. I think they have a home market for about all they produce.

Q. What is the price of that skim milk cheese compared with the other?—It goes for all prices according to quality. It depends upon the skill with which it is made and the amount of the cream left in it. Where one-fourth of the cream is taken off the cheese is made generally as home-made cheese. There is no difference in it. In fact, I have often known experts to be mistaken in it. If half the cream is taken out it will reduce the value; if three quarters is taken out, it will be poorer still.

Q. Is the price of skim milk cheese fixed on the market?—The cheese is all sold under the tryer. Each lot is tested at Elgin, Illinois; there is hardly a whole cheese sold on the market; yet it is one of the largest markets in the United States. Almost all of it is skim cheese. The buyers come there and examine the cheese on market day, and when they are satisfied with it they make an offer for the lot. It goes for 7 or 8 cents a pound when full milk cheese would sell for 9½, 10 or perhaps 11 cents.

Q. What is your opinion regarding the difference in the valuation of the two cheeses—the skim and the ordinary cheese?—The home-made cheese is generally the most valuable as an article of nutrition; the skim cheese is very seldom perfect enough or cured enough to make it digestible. In testing the digestibility of the different kinds of cheese, I find that the skim milk does not digest as thoroughly as the other, though it contains more nutrition than the home-made cheese does. By absolute nutrition, I mean what goes to build up the frame work of the body, not the supporter of respiration or what produces fat. Skim milk contains more nutrition than the home made cheese, and it would be capable of building up more structure if it were as digestible. But it seldom is, and for that reason is not so valuable.

Q. Of your own knowledge, do you know of any attempt made to make the skim cheese successfully?—Yes. The most successful mode of making skim cheese is to skim all the butter off—the cream off—just as perfectly as it can be; and then introduce into the milk a little clarified lard—deoderized lard—or cotton seed oil, or both mixed together. Pour in a little of the oleine, one or one and a-half pounds to every hundred pounds of milk. Of this they make a splendid cheese; it is very palatable and digestible and wholesome.

Q. It requires skilled hands?—It requires some skill; and then there is so much prejudice against anything of the kind that you do not make much headway with it.

It is curious how differently people look at it. While our Government is contemplating legislation forbidding the manufacture of such cheese, Holland is sending experts over here at the expense of the Government, to learn the art, with a view to introducing it there. They appreciate it; but our people do not appreciate it. To give you a little idea of the profitableness of it, I may say that our dairymen get, where they make whole milk cheese, as a net return for their milk, a little less than 1 cent a pound—that is a little less than $1 a hundred. The men who make this lard cheese, as we call it, that is, taking out all the butter they can get, and then making cheese with the addition of lard, get about 2½ cents net for their milk. It is a vast difference, and the return in the one case is actually more than double the return in the other. But notwithstanding all this, the prejudice is so strong there is no getting ahead with it.

Q. Is the great oleomargarine factory in New York still in operation?—Yes.

Q. Manufacturing artificial butter?—Artificial butter.

Q. What is the price of it on the market?—It generally sells for about 2s. (25 cts.) a pound when the other butter will sell for 30 or 35 cents.

Q. It is higher than the common butter?—Higher than the lower grades of milk butter. The manufacturer sells it usually for about 17 or 18 cents. One of the manufacturers I know sold it wholesale at 19½ cents. That was an extraordinary price, 2 cents higher than any other oleomargarine buyer gets, because he made a nicer article.

*By Mr. Landry:*

Q. What are the nutritious qualities of that butter?—There is no nutriment in butter; it is only as a supporter of respiration that it is valuable, and there is no difference between butter and its substitute, in regard to the amount of fat it gives. One is as poor as the other. In fact, an analysis of them shows them to be almost precisely alike.

*By the Chairman:*

Q. You spoke of the oil for the oleomargarine: is it tallow?—It is oleine and margarine. Oleine is pressed out of tallow. Tallow is made up mostly of sheerings of hard, white fat. There is what is called margarine. Margarine is another hard oil, and fat, but not so hard as sheerings. Its density is about in proportion to its melting point. The melting point of sheerings is 145, that of margarine 120, so that it would be considerably softer than sheerings. The oleine melts below that. It is in a liquid state in ordinary temperature, and that is why we call it oil. Margarine and oleine are pressed out of the tallow and the butter is made out of them by churning them in sour milk with the cream and all in it. It runs out on pulverized ice which at once gives it the texture of butter, otherwise it would granulate or crystalize. In this way crystalization is prevented. The oleomargarine has the consistency of butter, and the flavor of butter, which it gets out of the milk it is churned in.

*By Mr. Benoit:*

Q. Does not that butter require some special provision for keeping it?—It keeps itself just the same as other butter. Before they churned it in sour milk there was no difficulty in keeping it for a length of time; but since they have introduced the method of churning it in sour milk to get the sour milk flavor, they carry cheesy matter into it which will decompose in a little while, and that changes the keeping quality of the butter. It will now grow rancid as ordinary butter does.

Q. They do not use brine to keep it?—No; it keeps as well as any butter.

Q. Not longer?—I do not think it does now, but it did before they introduced this element of sour milk into it. At that time it would stand in a warm room for days without changing, where butter would change at once.

*By the Chairman:*

Q. What do you think of the centrifugal machine?—It is probably the coming machine for separating cream; but it is not perfect yet. Probably in half the instances in which it has been been used, the butter has been perfect, and in the other half the butter has not been perfect. The fact, however, that some perfect butter has been made by its use is evidence that it can be, when we come to understand its conditions.

The machine, too, is too costly now for general use, and requires too much power to run it. It is, besides, too intricate for the common farmer to handle. It requires to be simplified, and probably in process of time it will be, so that a dairyman owning some forty or fifty cows can afford to use it. Of course, small farmers will never use it.

*By Mr. Landry:*

Q. What is the cause of the difference in the making of the butter with that machine; how is it that half is good and half is not?—The cause is in the way in which they get the cream off and the way in which it is worked. As some handle it, it gets a little greasy and there is too much friction. Others handle it so that it does not make that friction.

Q. I suppose it might have been caused in the preparation of the instrument itself?—Yes; it is probably all due to the structure of the instruments they use. The instrument is coming very rapidly into use on the other side. There are a great many of them sold. They save a great deal of trouble. They will probably be very much in use in the Southern States—more than in the north, because, in the Southern States they cannot keep butter long enough to have the cream raised, on account of the high temperature and the lack of ice and cold water. By starting the milk immediately that it comes from the cow, with a centrifugal machine, they can make cream into butter with perfect safety. It will, no doubt, have a more successful run there than it will have further north.

*By the Chairman:*

Q. Have you visited any experimental farms in the United States, owned by the Federal Government or the State Governments?—We have experimental stations. We have not many experimental farms. We have a few. All are supported by the Government. We have one at Geneva, New York, containing 125 acres.

Q. Do you think the results from these farms are good?—Very good. Most of the Eastern States have stations. Pennsylvania has them. Several of the Southern States have them, and most of the Western States.

*By Mr. Landry:*

Q. Do they take in all branches of agriculture?—General agriculture.

*By the Chairman:*

Q. Do the farmers derive benefit from them?—They are not deriving a great deal yet. The stations have not had time yet to do a great deal, especially the New York station. It has not developed any very great result yet, but it is in a fair way. It has a very able director. It cost $20,000 a year.

*By the Chairman:*

Q. Have you visited the experimental garden attached to the Department of Agriculture at Washington?—No. The Department, I may say, is doing a great deal of good. As an illustration of its usefulness, I may allude to the efforts that were made to induce the cultivation of sugar in the Northern States. That work was very successfully started, and with a fair probability of making sugar in New York, in the Western States generally, and even in the north-east, as successful as it has been in the Southern States or the West Indies.

*By Mr. Benoit:*

Q. Sorghum?—Sorghum.

*By the Chairman:*

Q. And that was brought about by the Bureau of Agriculture?—Yes. The enterprise was going on well, but with greater aid from the Bureau it would have gone on swimmingly; but it was all knocked on the head when the present Commissioner came in, for he put his foot down on it.

Q. Have any attempts been made by that Department to stop the ravage of insects?—Yes; there has been something done in that line. They publish reports every year containing the suggestions of the entomologist, a good many of which are quite valuable. They are considered to be of a great deal of use. For instance, to the cotton interest they have been useful, as they have shown how to manage the cotton worm and avoid it. They help us, too, a good deal, in the production of fruit.

Q. I have been told that the efforts of the entomologists have been very successful with the grasshoppers?—Yes.

Q. And that it is due to them that of late the grasshopper has not done much damage?—Yes. There were two or three entomologists sent to the grasshopper region to make observations and experiments. All reports concur in the opinion that they did a great deal of good, and that favorable circumstances combined, they have led to the wiping out of those insects. The grasshoppers are liable to come around again, but they have not done so yet.

Q. Some one told me they had found the source of the evil and the means of preventing it from spreading?—Yes.

*By Mr. Benoit:*

Q. Has the Government of the United States any such public institutions as they have in France, known as the Harras, for the selection of good horses and the keeping of good breeds for sale to the farmers?—No; we have no Government station of that kind.

Q. It is all left to private enterprise?—Yes.

The Committee adjourned.

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OTTAWA, 4th March, 1884.

The Committee met, Mr. GIGAULT in the Chair. F. X. PERRAULT, of Montreal, called and examined.

*By the Chairman:*

Q. What experience have you as an agriculturist?—I am a pupil of the Royal Agricultural College of Cirencester, England, and have taken my diploma at the National School of Agriculture of Grignon, in France. Since then I have edited the official organ of the Board of Agriculture of the Province of Quebec for twelve years. While in Europe, I travelled most of the continent, partly on foot, and visited the German Schools at Hohenhein, and many farms in Germany, Holland, England, Scotland, France, Switzerland, Belgium, Greece, Turkey, Russia and Italy. I have had several agricultural tours with a professor. I have acquainted myself, also, with the United States, and have travelled in the Western States as well as in the Eastern and Northern States, and have visited several agricultural schools there.

Q. Did you study the working of Bureaux of Agriculture in foreign countries?—Yes; I have visited, for instance, the Washington Bureau of Agriculture, with its branches, and I am acquainted with the gentleman in charge. I am of opinion that no Department in any part of the world is equal to the Department of Agriculture at Washington, either as regards the importance of the work accomplished, the high value of the reports published, or the practical results obtained.

Q. Could you describe the working of the Bureau of Agriculture at Washington?—The work of the Bureau of Agriculture is better described by their annual reports. The report for 1882, which I hold in my hand, contains 700 pages, fully illustrated with diagrams as to the production of crops, and the experiments made in the different Departments. I have no hesitation in saying, that of all the works published by any Government, the work of the Bureau of Agriculture stands the highest. They have full authority to treat of all agricultural and scientific matters; the scope of their reports is therefore more extensive than that of any other country, which circumstance is due to the variety of climates found in the United States, to the extent of territory, which is as large as Europe, and to the necessity of developing that territory under the most advanced principles of advanced agriculture. I have made a statistical calculation of the report published by that Department, and I find that 300,000 copies are printed yearly of their report, which averages 600 pages, and contains maps and illustrations upon all important subjects. Besides that, in 1883, there were published twenty-nine special reports on special questions, such as diseases of animals, special subjects for culture, injurious insects, forestry and so on. These reports cover 2,469 pages and 245,700 copies have been distributed; so that the total reports for the year amount to 3,069 pages and 545,700 copies. The illustrations, which are numerous, are got up in the most scientific manner and most artistic style, and will compare favorably with anything done anywhere. Besides publishing these reports the Bureau has a botanical and propagating department which occupies the common around the agricultural building in Washington. This common is planted with all the native trees of America, besides all the foreign trees which can be profitably imported and acclimatized. The common and scientific name of each tree is attached to it and the collection is most complete. Besides that there are the propagating houses, which cover several acres. By the aid of these propagating houses the American Government has succeeded in making Florida, which was originally a useless waste of sand, one of the richest parts of the United States. This was effected simply by the culture of the orange. Millions of the plants of the orange tree were cultivated in Washington and duly despatched to Florida, where they have since grown and made excellent returns. Tea culture has also been advanced in Washington, and now tea is cultivated in the mountains of California. The cultivation of the vine has also been encouraged, with a view to the production of wine. Millions and millions of gallons of wine are now produced in the United States, and the production has caused very considerable anxiety in France. The cultivation of the vine has largely been directed through the Department of Agriculture; and so on with other plants. The Department has now taken up the culture of the silk worm. Of course the worm feeds on the mulberry. The mulberry tree requires certain conditions of climate and it cannot ordinarily be cultivated farther north than a certain degree; but they are pushing it. Now, there are extensive orchards of mulberry trees and they are multiplying the silk worm to a considerable extent, so that, no doubt, in a few years the United States will be in a position to supply itself with the silk it requires. It is the same with the sorghum, which has been introduced into most of the States and now grows millions of gallons of syrup, whereas, before, the cane syrup was the only article used. The Department has very much helped in the development of that industry. Again, the Department is propagating trees, and in the west they are studying the timber question, with regard to the western prairies. I would just here beg to state that all those questions which affect the Northern States —the border States of Canada—are applicable to Canada. In fact, in their reports there is no dividing line in their geographical maps; and the scientific lines which indicate the area within which a certain plant can be propagated are run through the Dominion as well as through the United States. So that really the Department of Agriculture here can take advantage of all these reports and apply them profitably to the circumstances of Canada, without being at the trouble or expense of getting them up. That consideration makes it so much easier for the Government of Canada to create a branch of agriculture at a very small expense. By consulting these reports for the last twenty-five years, you will find that there is scarcely a quesion which comes up in Canada in regard to cattle, the propagation of plants, forestry or fruit culture, which has not been thoroughly stated and thoroughly explained in their reports. So that a compilation of reports on a similar scale, applicable to Canada, could be easily made, and could be published at a very small expense. The illustrations, too, could be obtained from the United States. They are very free and hospitable in that matter. The Department of Agriculture might publish, for the benefit of Canadian farmers, a synopsis of these reports, which are most valuable, and relatively at a very small expense.

Q. What functions might such a Bureau as that at Washington perform with advantage in Ottawa?—I should think that the policy of Canada is to follow the United States in that matter. By following what they have done, the work can be carried on at relatively a small price at Ottawa, and you can get just the same results as those obtained in the United States. In fact, I have prepared a little scheme of the way in which it might be economically done in Ottawa, which I would beg to submit to the Committee.

Q. Will you be kind enough to read it?—First of all I would beg to refer to the fact that an agricultural branch has been established in Ottawa, and I hold in my hand the Order in Council which it established it. It reads as follows:—

"On a report published 17th April, 1877, from the Hon. the Minister of Agriculture, stating that the Department of Agriculture is now divided into three branches, viz.: Statistics, patents and immigration.

"That an agricultural branch has not yet been organized, although a most desirable one in an Agricultural Department, and recommending that he be authorized to make such arrangements as may be required for the organization of an agricultural branch, provided no additional appropriation be required by the Department for that purpose.

"The Committee advise that the requisite authority be granted.

"Certified. W. A. HIMSWORTH,
"*Clerk Privy Council.*

"To the Hon. the Minister of Agriculture."

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This Order-in-Council was followed by the appointment of thirteen gentlemen as members of the Dominion Council, and I hold in my hand the report of the meeting of that Council, held on the 25th April, 1877. The Council was fully organized, with Hon. Mr. Christie as President. It divided itself into several Standing Committees, viz.: (1) Agricultural and Horticultural Boards and Societies. (2) International, Interprovincial, Provincial, District and County Exhibitions. (3) Agricultural and Veterinary Education. (4) Agricultural Statistics. (5) Museums, Library and Annual Report. (6) Forrestry and Public Domain. (7) Stock-raising and Contagious Diseases. (8) Field Operations. (9) Gardening and Fruit Culture. (10) Dairy Interests. (11) Home and Foreign Markets. (12) Injurious insects. One of the members was was appointed to treat on one of each of these questions, and to make a report at the following meeting. Unluckily the absence of all funds to pay the travelling expenses of the gentlemen, and even the expense of printing the reports, prevented any further action. Mr. Christie would not call a meeting unless the Government would pay the travelling expenses, as in Ontario, but the Government did not feel itself warranted in doing that. Still, as a matter of fact, the Branch has been organized and the Government can continue it by filling up the vacancies in the Council. The whole organization has been established, and if it has not proceeded to work it is due to the fact that no appropriation was made to meet the expenses of carrying out the proposition. I thought that explanation was necessary as a preliminary. Now, here are my suggestions:—

"In the month of April, 1877, on the report of the Hon. C. A. P. Pelletier, Senator and Minister of Agriculture, an Order in Council was passed by the Privy Council appointing a Dominion Council of Agriculture, composed of prominent agriculturists of each Province, with instructions to advise the Minister of Agriculture on all questions involving the agricultural interests of Canada.

"On the 5th of that month the first meeting of the Council was called and held in the rooms of the Hon. Speaker of the Senate, the Hon. David Christie, who was appointed President of the Council; Mr. J. X. Perrault was appointed Secretary, and twelve Standing Committees selected, covering all the subjects which were properly entrusted to the direction of the Board.

"This was practically establishing the agriculture branch of the Department of Agriculture. The Council was then adjourned to meet at the call of the President.

"During recess the Hon. Mr. Christie called on the Government to provide for travelling expenses of the members of the Council, so as to allow them to do justice to the important work entrusted to them; also, for an allowance for office and sundry expenses.

"This allowance having been declined, the President would not take the responsibility of calling the Council together at the expense of members, and no other meeting was held since.

"The Bureau of Agriculture of Washington, which has an annual appropriation of $500,000, is undoubtedly the best conducted Department of Agriculture in the world. Its annual reports are standard works, which are held as authorities on all agricultural matters. The work done by the Bureau and the results obtained are immense. At an agricultural point of view, there is no dividing line between the Northern and Western States and the Dominion of Canada. In all the elements of agricultural production and wealth we are one country. Therefore, all the various questions, affecting stock or field productions, which have been so thoroughly investigated in the border States, at Washington, may be applied to Canada. No doubt arrangements could be made to obtain the use of the illustrations or extra copies of the reports for distribution in Canada. By following the course adopted by the American Bureau, the following divisions might be put in operation at once, at reasonable cost to the Government:

"1. *Division of Gardens and Grounds.*

"The Government grounds, both in the city and Rideau Hall are ample for plant propagation. Glass houses only would have to be provided; the gardeners already attached to the grounds giving their services to the Bureau, under proper direction.

"2. *Botanical Division.*

"Prof. Bell, who is attached to the Geological Survey, contributed a most remarkable collection to our Paris Exhibition, and might probably be available to take charge of this division, in connection with the gardens and grounds, without breaking his connection with the Survey.

"3. *Microscopic Division.*

"4. *Chemical Division.*

"The Geological chemist might be intrusted with the work connected with this division, when required, without interfering with his ordinary duties. The Geological Department is under the charge of our most scientific men, and in receipt of a large annual grant. These gentlemen would, no doubt, with pleasure, give their assistance as scientists, to the investigations intrusted to them by the agricultural branch.

"5. *Entomological Division.*

This Division also might, with advantage, be left to the scientists attached to the Geological Survey.

"6. *Division of Statistics.*

"Agricultural statistics could be economically obtained through the 500 agricultural societies of Canada. In each township the director of the society would fill up the printed forms by basing his estimates on so much per cent., more or less, than the last official Census printed on the forms. These forms might be filled four times a year.

"The secretary of the County Agricultural Society would control the township returns and establish the totals for the county.

"A statician for each Province would receive and control these county returns and prepare a provincial report for the statistical department at Ottawa, where the final report for quarterly publication would be prepared. The work thus organized would not entail a large expenditure and would be sufficiently accurate for all practical purposes. The statistics obtained in the United States are due largely to voluntary work, and the officials connected with our agricultural societies will be found both able and willing to give their co-operation in this important work.

"7. *Veterinary Division.*

"Our Quarantine staff already organized and attached to the Department of Agriculture could, with advantage, take charge of the work of this division when required, entailing no additional expenditure of any importance.

### "8. *Departmental Reports.*

"The Washington agricultural report is printed yearly at 300,000 copies, averaging 600 octavo pages, with illustrations and maps on all important subjects. In 1883 twenty-nine special reports have also been published, amounting to 2,469 pages and 245,700 copies. The total reports for that year thus amount to 3,069 pages and 545,700 copies, besides several hundred illustrations. A large proportion of this work applies to Canadian agriculture as well as that of the United States and, properly compiled, should be distributed to our agriculturists.

### "9. *Forestry Division.*

"When it is remembered that the importation of forest products by Great Britain amount annually to $500,000,000; that our forest exports in 1883 amounted to over $25,000,000 and that our forest production in Canada is estimated at $70,000,000, the importance of this division cannot be exaggerated. The management of forests, as adopted in Europe, so as to secure, by rotation, the permanent production of timber, is yet unknown in Canada. The best mode of propagating trees in the North-West is yet a matter of experiment. Both these questions should receive, by the forestry division, immediate attention.

### "10. *Seed Division.*

"The Washington Bureau has distributed, in 1883, 2,038,935 packages of seeds through Senators and members of Congress, and a grand total of 2,467,230 packages altogether. The same agency could be secured in Canada. Our representatives at Ottawa would willingly, during parliamentary Session, attend to the proper distribution of seeds between the progressive farmers of their constituencies. The supply would all be obtained from the gardens, grounds and propagating houses of the Department, so that this would not entail a large expenditure, the distribution being done through the Post Office Department.

"This organization being properly applied, I am under the impression that an appropriation of $25,000 would meet the whole expenditure of the agricultural branch, as detailed above.

**"J. X. PERRAULT."**

Of course many of the officers mentioned may be gentlemen now attached to the Civil List, and receiving salaries, who will be only too happy to help the Bureau of Agriculture to publish reports on important matters that may arise. It will be easy, from the reports of the Washington Department, to make reports. The illustrations are always the most costly part of the report. If you get them from Washington our reports would not cost 10 per cent. of what the Washington reports cost the United States. As to the number of copies we might publish, I should say that we would require nothing like 300,000. Five thousand, I should suppose, would be a large edition for us. I should think that 5,000 distributed every year among agriculturists would do a great deal of good and tend to increase considerably their productions. With reference to my proposal on the subject of forrestry, I may say that one is surprised, when travelling through England or France, to see more wood there than in Canada. Every person there takes good care to keep up the growth of the productions of the forest. By a system of rotation this is quite possible. If it takes fifty years for a tree to be fit for timber you have a fifty years' rotation. You divide the forest into fifty parts; you take down one-fiftieth and replant one-fiftieth every year. Thus, at the end of the period you find the forest just where it was before, and although you have cut off a considerable quantity of timber, still the permanency of the supply is not altered. That system applied to Canada would yield the same results as it does in Europe, and in fifty years we would have just the same quantity of timber as we have now. The system applied in Europe is altogether unknown in

Canada, and it would be important that the forrestry division should get the idea known. With reference to the distribution of seeds and plants in the United States, let me say that the members of Congress distribute them among their constituents. They know where to send them, and care is taken of them by those who receive them. The propagation of them then goes on at a very great rate, and they are spread all over the United States in that manner. These plants do not cost much. They are propagated in the houses of the Government at a few cents a piece or a cent a piece; others of them are the seeds grown in the garden. If the grounds around the Parliament Buildings here, at Nepean Point, and those around Rideau Hall, which cover fifty acres, were utilized to propagate vines and other plants for distribution among the people of Canada, they would be a fine sight to begin with, and this would not cost a great deal, for the Government has gardeners already employed. If these were directed to plant useful plants, the cost would be but a trifle, and much good could be done, for the plants could be distributed by millions all over the country, as at Washington. The entire organization would not entail a large expenditure. By utilizing the services of the gentlemen now in the pay of the Government, who are attached to the Geological Survey as scientists, by utilizing the ground in the control of the Government, by utilizing the agricultural societies of Canada—of which there are 500—for the collection of statistics, by making use of the services of all those persons who are willing to help, the whole organization might be got up very cheaply, and would answer the purpose as well as the Washington one.

Q. What appropriation would be necessary?—There would, of course, have to be a gentleman in charge of the agricultural branch who would be a specialist, and probably an assistant. Then the gentlemen attached to the Geological Department might receive a supplement for their assistance; but they would only be called upon occasionally, because the first duty of the Bureau would be to analyze the Washington volumes and extract from them the results they have obtained at Washington. The building of a few propagating houses would cost something, to begin with. But I think $20,000 a year would cover the building of the houses and the extra help which would be required for the gardeners, the two or three employees who would constitute the agricultural branch proper, the scientists and the statisticans, one of whom, I think, would be necessary for each Province. The gentlemen who are in the statistical department now would do that work. Then the printing would have to be included: that is, the printing necessary to the publication of the reports. These would be the necessary expenses. With a Dominion Council of Agriculture composed of a few representative men from the whole Dominion, who would receive no salaries, I think a proper direction would be given to the agricultural branch. These gentlemen could superintend the work of the branch in the various Provinces whence they come. Such Boards now exist in every Province, and if they are found necessary in every Province, it is equally necessary to have one for the whole of the Dominion, particularly as the expense would be but a trifle. I think a Council would be a very useful appendage to the agricultural branch, although it is not an absolute necessity. In Washington they have not a Council. The Commissioner there, Mr. Loring, is practically the Minister of Agriculture; and now there is a motion before Congress to establish a Minister of Agriculture, the Minister being one of the Secretaries of State. They have only five Secretaries of State and they want a sixth, who will be in charge of Agriculture.

Q. Do you believe the establishment of a Bureau of Agriculture would have the effect of increasing our agricultural products and to improve the quality of our agricultural products?—Naturally, of course, getting these plants, importing seeds and so on, are all very expensive operations for the farmer. Our farmers have neither the leisure nor the means to carry out these operations as a Government will. Then if the Canadian Government called upon the Washington Government to give them a collection of what they have in Washington, the request would be granted immediately without costing a cent. This kind of thing is done by one Government for another every day. But if an individual were to ask for such a favor, having no authority to back his application, and being unable to give a guarantee that he was not engaged in a private speculation, his request would not be acceded to. So that a Canadian agricultural branch might obtain immense collections from foreign countries.

Q. Do you think a large monetary loss is suffered by our agricultural classes on account of the want or insufficiency of agricultural knowledge?—I believe so. There is, I may say, no agricultural library in the country. There are some very interesting journals on agriculture, which give daily operations; and their editors are glad to give them. I see Mr. Weld here, who is the editor of the *London Farmers' Advocate*, an agricultural paper which has a very large circulation, and which I have been reading for the last twenty-five years. This gentleman has no subsidy of any sort. He has to make a paper for sale, and he is governed in his enterprise by circumstances. He cannot publish a work of that standing which requires costly engravings, scientific research, and so on, which are altogether beyond private enterprise. It is well known that scientific works cannot be published as a speculation. At the same time, it is only by having these reports widely spread through the country that we can educate the agriculturists of Canada to be the equals of the agriculturists of the United States, who receive such reports gratuitously and can educate themselves thoroughly on all agricultural questions; it is only by these reports that we can educate our farmers to compete with the American farmers in the markets of the world.

Q. Under what difficulties does the present system of agriculture labor, and in what respect is the Canadian farmer placed at a disadvantage when competing in foreign markets?—As to that, I consider that we are in a very difficult position, as farmers, to compete for the sale of our products. Of course, our great market is the market to the south of us—the American market. To those who were farmers twenty years ago, it is well known that when we had reciprocity we had very large prices for our barley, oats, &c., and that we had the greatest facilities for selling them. But now, as we have to pay an average of 20 per cent. on all the agricultural products we send to the United States, we are obliged to find a market for a great many of our products on the other side of the water. I have taken the trouble to prepare some statistics of the value of products we have exported to the United States, compared with the value of the products of the same class produced by the United States for the year 1882-83. I find that we have exported, for instance, 12,635 horses, of a value of $1,597,611, on which we paid 20 per cent. That is, we paid $319,522 to the Government of the United States for the privilege of selling our horses to the Americans. Of course, there is a theory that it is the buyer that pays the duty, not the seller, but when we come to look at the fact that there are ten millions of horses in the United States, we cannot suppose that the 12,635 we have sent there have altered the market price. The horse buyer who comes here to purchase a horse knows, if he can sell it for $250 in New York, he will have to pay 20 per cent. to get it across the line; and he will knock off $50 on the price in Canada, because he has to pay that amount to the Custom House to get it into New York. I have had practical experience of that. I sold a couple of Percherons to an American buyer, who said: "If you will get them across the line I will give you $50 extra right off." I will not trouble you with all details of our exportations of agricultural products to the United States; but I will give you the general result. I find that of animals we exported last year $3,006,435, on which we paid duty to the extent of $601,286. Of field products we exported $11,527,769 worth, on which we paid $2,271,762 duty. Of animal products, butter cheese, and so forth, we exported $485,043 worth, on which we paid a duty of $197,128, something like 40 per cent. Now the same productions in the United States are these: there are of animals in the United States, $1,349,389,091 worth; of field products for the year, there were $1,126,661,015 worth. Of the same products we exported over $11,500,000 worth to the United States, that is about 1 per cent. Of animal products there are in the United States for last year, $450,000,000 worth; we sent them similar products, butter, cheese and so on, $485,000 worth, or about one-tenth of 1 per cent. We therefore cannot pretend, in that case, that the buyer pays the duty. The drop we send into the sea of production of the United States does not comparatively amount to anything. It cannot affect the market price at all. Therefore, it is the Canadian farmer who pays the American duty. We sent $15,000,000 worth of these agricultural products into the United States, and we paid $3,000,000 of American duty. In other words, we paid $3,000,000 for the privilege of sending $15,000,000 worth of agricultural produce into the United States. I consider that this is a great drawback to the Canadian farmer.

1884

## EXPORTATIONS to the United States, 1882-83.

### ANIMALS, &c.

| No. | — | Value. | Duty. | Lost by Agriculturists. | Value of United States Products. |
|---|---|---|---|---|---|
| | | $ | | $ | 1879.<br>$ |
| 12,635 | ...Horses .................... | 1,597,611 | 20 p.c. | 319,522 | 573,254,808 |
| 23,260 | ...Cattle .................... | 516,585 | 20 " | 103,317 | 586,487,255 |
| 3,634 | ...Swine .................... | 11,301 | 20 " | 2,260 | 110,613,044 |
| 228,541 | ...Sheep .................... | 723,650 | 20 " | 144,730 | 79,023,984 |
| ..................... | ...Poultry .................... | 157,288 | 20 " | 31,457 | |
| 268,090 | ................................ | 3,006,435 | 20 p.c. | 601,286 | 1,349,389,091 |

### FIELD PRODUCTS.

| | | | | | |
|---|---|---|---|---|---|
| Bush. | | | | | 1883. |
| 8,741,626 | ...Barley. .................... | 6,245,263 | 15c bush. 20 p.c. | 1,311,243 | 30,090,742 |
| 142,325 | ...Beans .................... | 212,282 | 10c. " 10 " | 14,232 | ..................... |
| 607,953 | ...Oats .................... | 275,320 | 10c. " 30 " | 60,795 | 150,243,565 |
| 368,697 | ...Peas .................... | 381,084 | 10c. " 12 " | 36,869 | ..................... |
| 912.486 | ...Rye .................... | 605,801 | 15c " 20 " | 131,872 | 18,564,560 |
| 878,471 | ...Wheat . .................... | 841,738 | 20c. " 20 " | 175,694 | 474,291,850 |
| 103,036 | ...Other .................... | 57,684 | 10c. " 20 " | 5,768 | ..................... |
| tons 89,005 | ...Hay .................... | 843,404 | 20 p. c.............. | 168,680 | 371,811,084 |
| brls. 1,329,641 | ...Malt .................... | 1,136,556 | 20 " .............. | 227,315 | ..................... |
| 2,181,631 | ...Potatoes .................... | 928,637 | 15c. .............. | 139,296 | 81,062,214 |
| | | 11,527,769 | (10) | 2,271,762 | (6)1,126,064,015 |

### ANIMAL PRODUCTS.

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Estimate. |
| 986 387 lbs. | ...Butter.................... | 206,154 | 4c .................... | 39,455 | ? 300,000,000 |
| 221,529 " | ...Cheese.................... | 24,468 | 4c .................... | 8,861 | ? 50,000,000 |
| 13,413,744 doz. | ...Eggs?.................... | ? 2,251,304 | No duty.............. | ..................... | ..................... |
| 1,207,582 lbs. | ...Wool.................... | 255,043 | 10c., 11 p.c....... | 148,812 | ? 100,000,000 |
| | | 485,665 | | 197,128 | 450,000,000 |

### RECAPITULATION.

| — | Duty | On a Value of | Value of United States Products. |
|---|---|---|---|
| | $ | $ | $ |
| Animals ........................................ | 601,286 | 3,006,435 | 1,349,389,091 |
| Field Products ........................................ | 2,271,762 | 11,527,769 | 1,126,064,015 |
| Animal Products........................................ | 197,128 | 485,665 | 450,000,000 |
| | 3,070,176 | 15,019,247 | 2,925,453,106—½ of 1 p.c. |

J. X. PERRAULT.

*By Mr. Irvine :*

Q. Do you think that the Tariff we have, which is called a retalliatory tariff, has bettered the condition of the farmer in this respect ?—I have no opinion on that. I take the fact that we have paid that amount of money for the privilege of selling to the Americans, to whom, in spite of the $3,000,000 we had to pay, we were obliged to sell, as an evidence that the farmer has drawbacks.

*By Mr. Fisher :*

Q. As I understand your argument it is that, because our export is so very small in proportion to what is there used, that we have to pay the duty ?—Yes ; our export is so very small that it does not vary the market.

Q. You do not lay it down as a general principle that the buyer does not pay the duty ?—No ; in our case it is but a drop that we are sending there, at least that is how I look at it.

Q. But that does not controvert the general principle, that the buyer does pay the duty ?—I do not discuss that question. Now, there is another country in which we might have a very fine market, but from which we are debarred, and that is France. There is a very large demand for our products there, such as cheese, butter, hay; in fact we did send some oats and grain there. But there is an arrangment, which as you will immediately see, debars us from that market. It is this. There is no direct communication between the two countries, and what is the result? The French Goverment has a law under which all products entering France from a foreign port, other than that from which they were first shipped, have to pay a duty of $7.50 a ton, in addition to all the other duties. I exported, myself, some samples of pressed hay to France. At that time the additional duty was even more; I had to pay $10, because they had necessarily to be taken by way of Liverpool. They did not touch the wharf at Liverpool, but were transferred from the Canadian steamer to another steamer going to Havre. Because they had been transferred I was charged, when I arrived at Havre, another $10, on the ground that they had come through a foreign port. As we have no direct steamship communication with France, our cheese, our butter, and all our products that have to take the route by way of England, have to pay that extra duty, whilst the people of the United States, having direct lines to France, are exempt from it.

Q. Is there a very great quantity of agricultural produce exported from the States to France ?—Yes ; I have seen the steamers of the Transatlantic line filled to the utmost capacity every trip.

Q. What kinds of agricultural produce ?—Agricultural produce of all kinds; cured meats and so on. They send an immense quantity of Indian corn directly to France—millions of bushels—and it is used in distillation.

Q. Is any quantity of dairy produce exported to France by the United States ?—A great deal of cheese, butter, and so on. Whilst we have no direct line to France we are debarred from that market, which is really a large one. I was referring, a short time ago, to the question of importing foreign seeds by private enterprise. I, myself, imported some foreign wheat, some Black Sea wheat, from Russia, several years ago. I have here certificates regarding that wheat, and after reading them, I will tell what was the result of the importation. This is the sworn statement of the seller before the British Consul General for the Russian ports on the Black Sea, the Sea of Azof, and so on, regarding that wheat :—

"Appeared personally at the British Consulate-General, at Odessa, before me, George Alexander Stevens, Esq., Her Brittannic Majesty's Acting Consul-General for the Russian ports of the Black Sea and the Sea of Azof, Michel Bernstein, Esq., of Odessa aforesaid, for some time Commissioner, representing Russia at the Universal Exhibition at London, &c., &c., who declared that the 1,500 bushels of Black Sea spring wheat, sold by him to Joseph Perrault, Esq., delegate of the agricultural societies of Canada, now at Odessa, has wheat grown in the neighborhood of Odessa, thoroughly well conditioned, and the finest lot of seed wheat procurable on the market, out of the actual colossal deposits now existing in the granaries of Odessa.

"The said appearor also hereby declared that the said 1,500 bushels of wheat have been, this day, shipped in bags on board the Russian Steam Navigation Company's Steamship "Odessa," for London, for transhipment to Canada, its ulterior destination.

"In faith whereof the said Michel Bernstein, Esq., has affixed his hand and seal at the British Consulate General aforesaid, this 12th day of February, 1869.

"Michel Bernstein, signed before me and resistered in the Notarial Register of this Consulate, sub-entry 445.

"GEO. ALEX. STEPHENS,
*"Acting Consul General."*

Here is the certificate of the Consul:

"It affords me much pleasure to certify that, through my introduction and recommendation, Mr. Joseph Perrault, as delegate of seventeen agricultural societies in Canada, has been assisted in the choice and purchase of 1,500 bushels of Black Sea spring wheat by the most competent parties in Odessa, and that the 1,500 bushels so purchased of Michel Bernstein, Esq., and shipped this day on board the steamship "Odessa," for London, in bags, is considered by connoiseurs as a splendid sample, not inferior to the best samples of seed in Odessa, where there are, at this moment, several millions of bushels of grain awaiting shipment.

"GEO. ALEX. STEPHENS,
*"British Consul General.*

"ODESSA, 12th February, 1869."

This seed was imported into Montreal early in April, and the agricultural society gave a certificate that it was according to order, and all that sort of thing. In fact, I delivered it only on condition that they were perfectly satisfied with the seed imported. It took a great deal of money to get the wheat, and I did it all at my own expense. The dealers, including Mr. Ogilvie, refused to take the order for it, on the ground that it was too late in the season to get it. So I left here on Christmas Day to secure it, and was back here in the first week in April, after having gone to Odessa for it. The society took the seed, and although it did not appear in the samples that the seed was mixed, when it grew we found that the beards were not of the same size; some were 1 inch and some were 2 inches. The society then declared that it was not pure wheat, but that it was mixed; and I am sorry to say several societies declined to pay me, and I was at a loss of $1,500 through the society which had given me the order. I came to the conclusion that it is impossible to go to Russia and to import the seed in a perfectly pure state, because it is not sown in that state in Russia. It is the practice in Europe very often to mix two varieties of seed, so that according to the weather the two varieties help one another and give a good result. I went to a great deal of trouble and lost considerable money in the undertaking, so I fear I cannot advise, from my experience, anybody to import Black Sea wheat into Canada.

*By Mr. Orton:*

Q. Have you much knowledge in regard to Russian fruit trees, and do you know if they would succeed here?—I have no information upon that subject. My impression is that we have some very excellent fruits now; and as Secretary of the Canadian Commission at the exhibitions in Paris and Philadelphia, I know that our fruit was admired as being equal, if not superior, to anything exhibited by other nations.

*By Mr. Massue:*

Q. What is your opinion of agricultural colleges as a means of educating the agricultural classes?—Being a pupil myself, having passed four years in an agricultural college in Europe, and having visited the German agricultural colleges, I am aware of what is being done in Europe; and I have no hesitation in saying that in buildings, organization and general results, the American agricultural colleges are far ahead of anything in Europe. Particularly can this be said of the school at Lansing. That school is the most complete school of agriculture there is. The grounds are immense. The professors have all their own residences on the farm; splendid colleges, surrounded by ornamental trees. The pupils are located in a dormitory, and there is a restaurant, where they take their meals. There is an immense laboratory, where they do their work, and a dissecting room, where the dissection of the horse and other animals is performed. The museums of geology and botany are the most complete museums of the kind. They have immense out-houses, where they do the propagating of plants, and immense grounds besides They have most of the improved breeds of stock in their stables. Of horses, cattle, sheep and swine, they have representatives of each breed, so that the pupils can become acquainted with the points of each. In fact, the collection is a regular live museum, to which they can go and judge for themselves. At the same time, the productions of these animals are sold in the neighborhood for re-production. As to farming, they have the best agricultural implements constantly in use, from the plough up to the threshing machine. These pupils handle all these machines, and they have a thorough course of lectures in mechanics and the construction of implements. How, the implements should be constructed to obtain a proper pulverizing of the soil and the proper placing of the seed on the ground, and at the proper depth. The school of agriculture at Lansing is thoroughly organized. There must be a million or a million and a-half of money spent there, and there are on an average 200 or 300 pupils—young men and boys. The pupils have to be of a certain age, and they have to pass certain qualifying examinations in grammar, arithmetic and the elements of chemistry, before they can be admitted. After four years study they come out of the school with a very thorough education and qualified to do their work in a very thorough manner. At Guelph, I believe the school is very thoroughly organized and I think it is a pity it is the only school of the kind in Canada. We have schools in Quebec, but they are not carried on at all on that principle. The pupils are young boys, and are taken from the uneducated class mainly. Of course, we have some exceptions, and I am glad to see in Mr. Landry, who was a distinguished graduate of one of those schools, a gentleman who was one of those exceptions. Generally there is one professor, who is a gentleman who has made no special study of the matter, but has gathered some general knowledge. He has often to teach his pupils reading and writing; and as you know, it is impossible to teach them botanical and veterinary subjects if they cannot read or write. I believe in the matter of agricultural schools Canada can take some lessons from the United States. In 1862 the United States appropriated 10,000 acres of public land for each representative in Congress and in the Senate, for each State. New York, for instance, had twenty-seven representatives, so it got 270,000 acres of public land. This land was given in trust to the State on the condition that the State would buy the farm and put up the buildings necessary for a school. The appropriation was simply to secure the proper professors, and the appliances and instruments necessary for the professors, such as museums, and so on. The different States passed laws accepting the grant and they immediately made offers to the different localities to subscribe in order to secure the college. Some towns that were ambitious to have the college, subscribed $50,000 or $100,000 towards it for the privilege of having it in their neighborhood, the Government besides making an appropriation towards it. Splendid farms were then secured and splendid buildings put up, and then the appropriation of the general Government went to pay the professors who, in several instances, were brought from Europe to take charge of the institutions. The consequence was that there was established in the United States a system of agricultural education equal, and even superior, to what obtains in Europe, after a great many years of work there in the establishment of agricultural colleges. I think it would be quite practicable for the Canadian Government to appropriate some of the lands in the North-West, of which there are millions of acres, for the purposes of agricultural education. Parliament could give to each Province so many thousand acres for each representative it sends to Parliament. Of course it would not be fair that Prince Edward Island, with its small population, should have the same as Ontario with its millions; but by giving an appropriation in proportion to the number of representatives in Parliament, every Province would have sufficient to allow it to do what the United States have done, and to have agricultural schools where the sons of our farmers would get a thorough education. Of course, in Ontario there is a school, but in Lower Canada there is really no education for the farmer, and the consequence is that the sons of our wealthy farmers do not continue in farming. They go out into the professions, but do not follow the profession of agriculture. There is no place in which they can study the science; and as, if they continue in agriculture, they have to carry it on in the drudging way in which it is carried on, there is no inducement for them to remain. The consequence is, as I have said, our wealthy farmers do not continue their sons in the avocation they are pursuing themselves, and the capital so necessary to work out proper farming goes out of agriculture, under which circumstances farming, necessarily, cannot be progressive. In France, in England, in Italy, where I have been, wealthy young men follow agriculture, and they think it is the calling of a gentleman to be an agriculturist. Agriculture is placed in those countries almost above every other calling. Here, on the contrary, as the people who wish to devote themselves to agriculture in Quebec cannot get the proper education they would like, they go into other callings and the result is detrimental to agricultural pursuits.

Q. You do not mean to say that the Province of Quebec is alone in that?—No I speak of that Province as I am acquainted with it, it being the Province in which I reside. I do not speak specially of the other Provinces, because I am not thoroughly acquainted with them. I merely point to the result in Quebec.

*By Mr. Orton:*

Q. Was the appropriation in land, made by the United States Government, land held by that Government in the various States in which the schools were established? No; the public land.

Q. Principally in the North-West?—Sometimes in the States, and sometimes in the West, where they had it. There was scrip issued on those lands by the Boards appointed by the several States, and they raised immediately sufficient capital to go to work and establish these schools. The same thing could be done here.

Q. Their colleges, then, are really kept up by the Federal Government?—The educational part of them. The fund raised by means of the land grant is permanent; it cannot be touched. The Federal appropriation is for the educational part of the enterprise. The buildings, the farm, and what are necessary to work the farm, are provided by the State Governments.

*By Mr. Fisher:*

Q. You say that scrip was issued; are you aware of any instance in which that scrip has been redeemed?—I do not know; I have not followed it any further. I know, though, that the colleges are all very wealthy

Q. Well, they got the money for the scrip that was sold, but whether the buyers saw their money again is a question?—I do not know how it turned out for the purchaser.

*By Mr. Landry:*

Q. Is there an agricultural industry that, you think, can be profitably established in this country?—Yes. Of course, we have already the cheese and butter industries, which are extensive; there are about three hundred of them in Quebec and I think that more can be established with advantage. Then the beet root sugar industry: it is a great industry, and our climate is perfectly suitable for it, judging by the investigations that have been made on that question by the Department of Agriculture at Washington. I may say that during the exhibition of 1878 I was acquainted with a gentleman who was there as the representative of the United States, and often talked with him on the subject of beet root sugar. He made a special investigation of the question in France, Belgium, Austria, Germany, and so on; studying the climate, the nature of the soil, the quantity of rain that falls, the degrees of temperature, and so on. We also studied what may be called the profitable lines of the production of beet sugar in America, taking in Canada as the Americans always do in their reports. His report of four or five hundred pages, thoroughly illustrated, is the most thorough study, I think possible, of the question of the beet sugar industry in America, because it gives the whole experience in Europe. There is a map of Europe with a dot on every spot where there is a factory there. There are statistics showing what the production of each factory has been, the yearly crops, the average percentage of sugar, the expense of putting machinery up, and the final result as a business enterprise. Applied to America, his lines do not go into California, because there was a test made in California of that industry. There was a beet sugar factory started there, but it was not a success. This gentleman, in his report, shows that the want of success in California was due to the fact that the climatic circumstances would not allow the profitable production of the beet root there, and that it was not within the range of beet-root cultivation. But the report shows that the whole of Canada is within that range. The report is to be found in the Library here, and it can be easily consulted. My opinion is that the beet root sugar industry can be made a success in Canada, just as it has been in Russia, Germany and elsewhere, where thousands of millions have been produced. I know it has not been successful in Quebec. And why? We called upon farmers who had not grown it before to take an acre apiece. They used the land as it was; it had no previous preparation; no manure or anything. It was common land that was taken in many cases. The farmer went to work first to secure his ordinary crops, and when he had done that he said, "Now, I am going to grow some beets." Not having the implements, not having the experience, not giving them sufficient care, the crops did not yield as they would yield if the beet crop was the main crop. It must be the main crop where there is a sugar factory. I have seen the factories at work in Europe. I have seen one farmer with 300 acres of beet roots. He did not wait until other crops were arranged for to look after his beets. He made them his main crop. At the farm school where we were, they had ninety acres every year for the use of the cattle. In England turnips are cultivated by the hundred acres. It can be done here, to a certain extent, though not perhaps so largely; but to cultivate the beet root successfully in this country, it must be done upon a large scale, with improved implements, with the land well manured and fall plowed, and with the beet as the main crop. Then, if the beets are planted early, in soil well tilled and well pulverized, they will have a good chance to spring up and give a good crop. If the work is done by horses, instead of by hand, as in Lower Canada; if all the operations are carried on economically, I am persuaded that with private capital and private farming the cultivation of beet root sugar in Quebec would revolutionize the Province and make us what France has been made, for it is the beet that has saved France. I have visited the farm of Mr. Decrombeck, at Leus, near Arras, north of France, where there was a sugar factory. This farm has 300 acres of beet roots, and the owner has 400 head of oxen always fattening in his boxes. Every week forty oxen go out fat and forty go in to take their places. The pulp is accumulated in immense silos and preserved there during the winter, and in summer is used for feeding the stock. Besides that, there is an immense quantity of linseed cake, that is not only used to feed the stock, but as manure. Guano is also used as manure. Mr. Decrombeck has a factory, in which he turns his beets into sugar. That is the first operation. Then he has a refining apparatus, with which he takes the brown sugar, as the Redpaths do, and makes it into white sugar. The pulp he uses to fatten 400 cattle all the year round. It takes about two and a half months to get them profitably fat to be sent to market. The animal is tumbled into a box four feet deep. During the two months and a-half he is feeding and fattening he never leaves the box. By feeding he gradually raises himself up, and just as he comes on a level with the floor he is regarded as being sufficiently fattened, and is sent to the butcher. The animal usually increases in weight by some five or six pounds a day. The moment the increase is less than a pound or a pound and a-half per day, the animal is sent to the market. And so the operation goes on. On this there were two crops in rotation. And what were they? Beet and wheat; nothing else. There were no oats, nor anything of that kind. One year there were beets in immense quantities; the next year wheat—thirty-five bushels to the acre. It is beet and wheat all the time. The owner of the farm, who commenced with nothing, and was originally a 'bus driver, is worth millions.

*By Mr. Orton :*

Q. What size was his farm?—Six or seven hundred acres, farm buildings and everything.

Q. How long did they keep the cattle in the stalls?—All the year round, and they were kept on the refuse of the beets. He not only consumed his own beets but those of his neighbors, who cultivated on a smaller scale than he did. In any place in Europe where there is a sugar beet factory, the proprietors produce the nucleus of their raw material, so as not to be dependent upon the half acres of anybody else. In Lower Canada the beet was grown fifty or sixty miles from the factory and carried by rail or boat to its destination. Of course that could not pay. Before the beet got there it cost a great deal of money to carry, and a great deal of it was damaged, smashed and so on. If a factory is to succeed in Lower Canada, or anywhere else, the beet root must be the main crop of the party that starts the enterprise; he must have the nucleus of the crop in his own hands, in order that there may be a certain number of tons sure for the factory to run upon, and then other parties may be invited to join and help. The moment we have the beet root, then we have the manure; and it is only through manure that we can quickly improve the agricultural resources of Canada. The question in Lower Canada is the production of manure. It is a costly thing now; while if we grow beets and sell them and get the refuse, it is equal to selling the beets and keeping them; that is, if the beets are properly treated. There are two systems of treating the beet. One is by diffusion. The beets are cut and put in water; the water diffuses all the substance in the beet and carries it away in a cheese. Then the pulp is not worth a great deal. But if the beets are put into a box and pressed by high pressure there are always certain elements which remain The pulp so treated is in a first-class condition to be absorbed by the animals, and to be converted into beef, milk, or anything else; and it is considered that the pulp is worth almost as much as the beet itself. So that disposing of the beets and getting the refuse is like selling them and getting them again. Under these circumstances the operation is profitable to the farmer; besides he secures the element of manure, which, for his land, is the main element. If we could get that industry started in Lower Canada, where sugar is so much consumed, there is no doubt that the land would double in value, as it has done in France. It is only since the introduction of the beet sugar industry into France that the land there has doubled in value. So I think it is an industry which should be fostered by the Government. Of course it is well known that Napoleon offered a reward of $1,000,000 to the party who should succeed in making sugar out of beets; and that is how the industry was begun. The science is now known everywhere; but still if there was some encouragement given to the person who would start such an industry, the thing would benefit the whole country, and it is admitted that what benefits the whole country should be paid for by the Government of the whole country. In Lower Canada, although the sugar beet is first-rate, although the percentage of sugar from the beets is good, still there were not sufficient beets produced, for the factories built in Quebec swallowed up a hundred tons a day. In France the factories work ninety or a hundred days in the year. They get through their stock of beets and stop, while here they could go only four or five days, because they had not sufficient production to keep them going. Those half acres entrusted to farmers who had no experience did not yield sufficient beets to give a satisfactory result. As far as getting the sugar out of the beet was concerned, however, the result was perfectly satisfactory.

Q. At what time in the year does the sugar beet come to perfection?—In the fall. There is a very great advantage in Canada, because we have a cold climate, which is entirely in our favor. The beet, after it is housed, continues to vegetate. I have seen in France, where it is warm, and where they have not cold weather, the beet continuing to vegetate after it is housed, and the sugar becoming cellulous. There is a depreciation of probably 10 per cent. in the value of the sugar in the beet in consequence of that In our country, on the other hand, where it is so cold in winter that vegetation cannot go on, it is stopped at once if you allow the cold air to get at the beet. Therefore, you can keep your beet for five months in Canada without losing any of the richness of its saccharine substance.

*By Mr. Fisher:*

Q. Will it do to allow the beet to freeze?—It will not hurt it at all; but it will be more difficult to rasp it in the factory. Still it is not necessary to have it frozen to stop vegetation.

Q. How do they store the beets in France?—They store them in a trench in the field, and they throw on top a little straw; after that, the earth that has been taken out of the trench is thrown on to the depth of about six inches. But the beets have never suffered from the cold. In the coldest winters in France they have never suffered.

Q. One of the great difficulties found, a year ago last fall, was that a great many of our beets did get frozen and spoiled; and there was a very great loss as a result?—Well, if the beet freezes and thaws it becomes corrupt; but if the frost remains in it, it is preserved just like meat or any other substance. If you allow the frost to go out, it has the effect of breaking the cellules of the plant, and when the cellules are broken the plant is dead and goes to corruption. But it does not take away the sugar if it remains frozen. In extracting the sugar you place the beet on a rasp, and the sugar is there just as when you dug the plant.

Q. In this country you will have to provide necessary cellars for the accommodation of the beets, which will add necessarily to the expense, and that is one of the things that will tell on the profit and loss?—Of course we have here immense duties for the protection of the industry.

Q. Not more than in France?—In France there is an Excise duty of 100 per cent.; that is to say, the sugar that brings 5 cents a pound in France pays an Excise duty of 5 cents to the Government. Thus, the French Government raises three or four hundred millions out of the home-made sugar. We have no excise duty here.

Q. What duty do they place upon imported sugar?—The same; the duties correspond.

Q. But is not the duty on imported sugar so much higher than the Excise duty upon home-made sugar as to give the manufacturers of sugar in France as high a protection as we give our sugar manufacturers here?—That is not my impression. You know France exports sugar.

Q. And the Government gives an export bounty?—Not now.

Q. They did for a long time?—Well, what is exported does not pay Excise duty. They do not pay duty on exports; they pay Excise duty on the sugar consumed. Actually, the sugar in Paris is worth 13 or 14 cents, while in England it is worth 7 or 8, because in England they have no duty, and the French sugar going there has no excise duty to pay. The French sugar sold in England is 30 per cent. cheaper than the same sugar sold in France, on account of the Excise duty put on in France.

Q. The protection on the imported sugar must be equivalent to the Excise or they could not do it; if the sugar can be sold cheaper in England than in France, and there was no import duty, it might be taken to England and returned to France?—They do not do that; they have an import duty equivalent to the Excise duty.

*By Mr. Orton:*

Q. Do you think the cold climate of our North-West would militate very much against the beet sugar industry there?—I do not think so. The cold has nothing to do with it. In the north of Russia the industry is carried on most successfully. In the report on the subject, published in Washington, of which I just have spoke, you will find marked the precise location of every factory in Russia, and you will see that there are fifty or sixty factories in the north. It is known that the beet root sugar of Russia is the richest in Europe: in fact, the farther north the beet root is grown the larger the percentage of sugar. In the Washington report there are tables indicating the richness of the beet root in the different localities in which it is grown. By consulting those tables you will find that the more northerly you grow the beet the quicker it grows, the more rapidly does it come to maturity and the richer it is in sugar. The beet has been greatly inproved in Europe. There are large farms there that do nothing else but produce the sugar beet seed. It is an immense industry. There are farms of five and six hundred acres devoted to the growth of the beet sugar seed. On these farms there is a large laboratory, and the chemist tests every beet root seed they wish to put in the ground. They use only those that promise a large percentage of sugar. And what is the result? They have come to produce 16 per cent. of sugar. A 100 pounds of beet to-day will yield sixteen pounds of sugar. I remember, twenty-five years ago, when I was in France as a student that 8 per cent. was considered a very high average for the beets; but since then, by proper selection by chemists, the have increased constantly the saccharine richness. The Silesia beet is the best sugar beet; it is immensely rich in sugar; but growers have assured me that the varieties that yield 16 per cent. have only been brought to that stage by proper selection and proper culture. Of course, the Silesia beet is specially chosen.

Q. Do you think the Federal Government ought to undertake the culture of the sugar beet and manufacture the sugar, instead of private enterprise? Do you think that that would be the surest way of creating that industry in Canada?—It is an industry that applies to all the Provinces, an industry which will double the value of agricultural land all over the country. The Federal Government will be the first to benefit by that extra richness of the country; and rather than allow each Province to multiply the experiments and the expense, it will be better for the general Government to do that work itself, because the experiments done at our expense by the Federal Government will be useful for the whole Dominion. If you leave the work to each Province you will have eight experiments to be made, and it will cost eight times more to make them than if they were made once by one Government for the whole country. I think it is the principle of our Federal system that where you have a general subject the general Government should carry it on for the whole of the Provinces, because general wealth will follow and because it will benefit the general Government quite as well as it will benefit the Local Governments. In the present case increases of importation will follow, the consumption of imported goods will be larger, and the duties collected will increase a hundred-fold over the amount expended by the Federal Government in promoting the industry for the good of the people. On that theory I think it would be for the general Government to do its share in promoting everything to the general interests of the people, as they do in Washington.

*By Mr. Landry:*

Q. Do you not think there are in this country obstacles, such as the shortness of the seasons, which calls for all the labor at one time, the devoting of our farms to other crops, and so on, that will always prevent the cultivation of the beet root as the main crop?—I do not think so. I think the inducements offered by our Tariff to the industry are very great. The duties on sugar average, I think, 35 or 40 per cent., and that is so much to the benefit of the enterprise. Then there are no Excise duties upon the sugar, as in France. Besides this there have been great improvements in agricultural implements. To-day machinery replaces the hand in a great many instances. Of course there are some operations that cannot be performed except by hand; but still they are minimized by the employment of implements. We want the industry here very badly, and I think we can find the people necessary to do the work, if the thing was started on a large scale, as in Europe. Here, undoubtedly, as the farmer has his land, he has no capital to work the land. In Europe to carry on beet culture you must have as much capital as the price of your land, in order to get proper manure, proper cattle, proper implements and everything else. It is the same here; but, unfortunately, though we have the land we have very little capital to work it.

*By Mr. Orton :*

Q. The land requires to be very well worked up ?—It requires a lot of capital; it is only the company that has the capital to start a factory that can do it. The factory in Berthier cost $300,000 in buildings. They ought to have $100,000 or $200,000 now to produce the beet, without which the factory is of no use.

*By Mr. Fisher :*

Q. Do you think it is possible to get, in the neighborhood of the factory, the labor necessary for the raising of a crop of beets, for a supply ?—I think so. You can bring labor there. The great difficulty, of course, is in the hoeing season, when you want all you can get.

Q. The labor is only required for a short time, probably a fortnight or so; the rest of the year it is not required; can you get that labor ?—I think so. Hoeing takes place between the sowing season and the hay time. There is a lapse of a fortnight or three weeks between the two, and it is then that hoeing comes on.

Q. But it comes in the haying too ?—Not if the beet is sown early. It would, of course, if you were to sow the beet in the month of June, when you have done everything else. But my impression is, that by sowing it early as the main crop, the hoeing will come on between seed time and haying; there is a fortnight then when there is nothing pressing on the farm, and at that time we can get the people to come there and hoe. The pulling of the beets is, of course, another operation. But where you wish to grow a hundred acres of beets, you require a large *personnelle* all the time. You must expect to have a large number of people there all the summer; and you can use the women and children to do that work, to a certain extent. By paying the people properly to go into the work you can get them. It is done in Europe. To those great farms in France the people go from Brittany to do the hoeing; they work there for a fortnight or three weeks, make a large amount of money, and then go back to their own country to continue their operations. There is quite an emigration in Europe from north to south, and back again from south to north, at that time, and the same thing might be done here.

*By Mr. Massue :*

Q. Is it not your impression that if skilful hands had been imported to settle near the Berthier factory it would have been a success; because then, instead of having beets from an acre of land, here and there, they could have had them from a large farm ?—Exactly. That is what I said from the first. I said the company should start themselves the nucleus of their factory.

*By Mr. Orton:*

Q. Beets are just as easily cultivated as turnips ?—The same thing.

Q. In our counties through Ontario, where they can feed cattle, they think nothing of raising eight, or ten, or fifteen acres of turnips for their cattle ?—But if, as with beets, they could sell their turnips, and get them back to feed their cattle, it would pay them better.

The Committee adjourned.

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OTTAWA, 5th March, 1884.

The Committee met, Mr. GIGAULT in the Chair. Mr. WILLIAM WELD, of London, Ont., called and examined.

*By the Chairman :*

Q. What experience have you as an agriculturist ?—I have been in the country here a little over forty years, and have cleared up a farm. During the past eighteen years I have devoted myself to publishing an agricultural journal—*The Farmers' Advocate.*

Q. Do you think that the dissemination of handbooks of agriculture would have a beneficial effect ? —I think it would have a beneficial effect.

Q. Do you think that the establishment of a Central Bureau, having for its object the collection of information upon all matters relating to agriculture, and having a skilled staff, capable of giving advice, making experiments and noting the improvements effected in other countries that might be advantageously introduced into the Dominion, would be a benefit to our agriculturists?—I think such is now, in a measure, being carried out. I do not know that it would be beneficial to establish another one at the present time. I consider that the information can be obtained and given by our agricultural journals in the country.

Q. You do not favor the establishment of a Central Bureau here, in Ottawa?—Not at the present time. I think it requires further consideration, and that we should see how those are acting that are already established.

*By Mr. Bain:*

Q. When you say there is a Bureau already established, you are referring to that of the Province of Ontario?—Yes; I think the question requires due consideration.

*By the Chairman:*

Q. What reasons have you for objecting to the establishment of such a Bureau?—Only that private enterprise can give the necessary information.

Q. So you do not believe in any Government action, or Goverment measures, on behalf of agriculture?—I think if they encourage existing enterprises - enterprises now established in our own country—greater good would be done.

Q. What do you mean by that; how could the Government favor the Bureaux which are established now?—By aiding the dissemination of information through such mediums as are established. For instance, we have our agricultural journals they can gather, if they have any assistence at all, all the information that is necessary or profitable for the country.

Q. Have you studied the working of the Washington Bureau of Agriculture?—I have not particularly studied it. I am aware that they are publishing a very vast fund of information, and we can easily compile and take from theirs what is beneficial for our country.

Q. Do you think the information given by the Bureau in Washington is not useful?—I think it is very useful.

If it is useful there why should not a Bureau be useful in Ottawa?—Possibly a good deal of good might be done by it.

Q. Have you noticed any appreciable deficiency in the crops of your district, owing to the depredations of birds and insects?—Yes.

Q. Do you think the farmers are losing a good deal on account of the ravages of insects?—Undoubtedly, they are.

Q. Do you think there are any means of destroying insects which are injurious to vegetation?—There are means being taken to destroy them.

Q. Did you see the report of the Entomologist at Washington, who says that the farmers lose more than $100,000,000 every year on account of the insect ravages to vegetation?—I do not doubt its correctness.

*By Mr. Massue:*

Q. Have you any agricultural colleges in Ontario?—There is one at Guelph.

*By Mr. Landry:*

Q. Do you think that a Central Bureau in Ottawa, under the control of the Dominion Government, would be more advantageous to the farmers than a Provincial Bureau?—I think that had such been established by the Dominion Government at first, it might have done more good. Whether established in Ottawa or elsewhere—I do not care where—it would have been better established under the control of the Dominion Government.

Q. Supposing it were established now, would it not be beneficial?—I look at the expense—at the expediency of going to the expense. I think the expense would be hardly justifiable. Look at the enormous expense incurred by the Washington Bureau. I think we would not be justified in taxing our farmers to that enormous extent.

Q. What are the expenses of the Washington Bureau?—From the testimony received yesterday, I think $300,000. I believe that is what Mr. Perrault said.

Q. Do you know anything of the expense, of your own knowledge?—I have not examined into it myself.

Q. Do you know what are the benefits the States gain by that Bureau?—I cannot answer exactly what they gain.

*By Mr. Fisher:*

Q. Do you not think that even with the provincial colleges and experimental stations there is a good deal of work applicable to the whole country which a Central Bureau should undertake, and relieve the Provincial Bureaux or experimental stations of?—I do; I think there is a great deal of work that might be done.

Q. Which, if it were done by the Provincial Governments, would have to be done in each Province, but if once done by the Federal Government would apply to the whole of the Provinces?—I believe it might be.

Q. In that case the establishment of such a Federal Bureau might be of advantage, although Provincial Bureaus have been established in some of the Provinces?—Certainly. I think so. My principal objection is on account of the enormous cost and the additional taxation we should have to be placed under.

*By Mr. Landry:*

Q. What would be the cost?—Judging by the progress our Ontario Bureau is making I think we should soon arive at an expenditure equal to that at Washington.

*By the Chairman:*

Q. But do you not know that the services of many of the officers the Government has now could be utilized?—Not without additional cost.

Q. Do you believe that agricultural knowledge should be disseminated?—I do.

*By Mr. Landry:*

Q. Do you think, if the profits derived by the community, by the dissemination of agricultural knowledge, are higher than a Central Bureau costs, that the question of cost should arrest the establishment of it?—I think the question of cost should arrest the establishment of it.

Q. Have you many subscribers to your paper?—I have.

Q. Could you give the number?—About 17,000.

Q. Could you give the circulation by Provinces?—I can. I can give the number of post offices in each Province that I send to; not the number that goes to each post office.

Q. Out of the 17,000 subscribers, how many have you in Ontario?—I did not expect to be called here to-day. It was quite accidentally that I was called. I would have brought my papers to show the figures, had I expected to be asked that question. I have the figures down exact; but I cannot exactly state how many I have in the Provinces without referring to my papers.

*By Mr. Bain:*

Q. How many agricultural papers are there published in Ontario—I mean papers that make agriculture a specialty?—I think there are four.

*By the Chairman:*

Q. Have you any suggestions to make to the Committee which you think might be favorable to agriculture?—Yes. I understand that it is proposed to distribute 250,000 pamphlets, at the present time, in regard to dairying; am I correct?

Q. This Committee never spoke of that?—Well, I think the information might be given to greater advantage by placing it in the hands of a journal or journalists, through whom it will fall directly into the hands of those who desire such information. Those things that are generally given away are valued at the price they cost, as a general rule. I was enquiring of Mr. Perrault, in regard to the publication and distribution of agricultural papers in Quebec, and he informs me that they were sent off in bundles and never opened.

*By Mr. Landry:*

Q. Did he follow the bundles?—I am not told; but he informs me of this. I have further enquired of really progressive, intelligent farmers there, and they say that the papers are of very little use and are not read.

*By Mr. Fisher :*

Q. Did they give the reasons for that?—Yes; that there is not suitable information in them.

Q. It is not because they get them for nothing; it is because the information in the papers is not what they want to get?—Yes; but I look upon such papers as rather detrimental than beneficial to the agriculturists, as they tend somewhat to prevent the circulation of papers that the farmers endorse, that the farmers pay for and require.

*By Mr. Bain:*

Q. How would you remedy that difficulty; would you propose that advance sheets of the evidence be furnished to the agricultural journals, so that they might reprint them at their discretion?—Certainly. They would be very glad to publish such information as they deem to be of any benefit or profit to the farmers—information such as is sought for by the readers of those journals.

Q. As a journalist, you would be pleased to publish it, if it were furnished to you, without cost?—If I could get it in a condensed form, such as I know the farmer would read, but not in the form of a Blue-Book. The farmers who do not take agricultural journals are not the foremost in new enterprises at all. It is to the subscribers to agricultural journals that these look for information.

Q. There is no doubt that the men who subscribe to agricultural journals are the men who are the most advanced in their profession?—And the others look to them for information.

Q. Have you thought this matter up; is there any direction in which you think something could be advantageously done by the Central Government here, outside of the question of statistics, or anything of that sort?—I think tree culture might be advantageously taken up. I think, too, that analyses of soils and manures and entomology, are subjects that might be advantageously taken up here.

Q. Our local Entomological Society has done a great deal in that direction in Ontario?—A great deal; it is doing a very good work.

Q. Then how would a Central Bureau be, in reference to the introduction of new trees and plants that might be adapted to our climate?—I think encouraging farmers to plant more would be one means; another one would be to remove the duties on trees coming in from the United States and from Europe. The duties should be removed from fruit trees and trees of all kinds. Let us have as free access for trees as possible. Some may say that this would check private enterprise, but the result does not show it. The very foremost of those who were clamorous to have the duty placed on trees, George Leslie, for instance, one of the oldest and largest established nurserymen in this Dominion, are now in favor of its removal. I think the farmers, too, would support me in asking for that; that is my impression.

*By Mr. Fisher:*

Q. Have you any further suggestions?—Mr. Perrault, in his remarks, said we were unable to make here illustrations in regard to plants, insects, trees, &c.

*By the Chairman:*

Q. He did not exactly say that; he said only that it would be expensive to have them made here, and that if we were to get them from the United States it would be cheaper?—His remarks were, "Mr. Weld cannot give the necessary illustrations, as he has no subsidy." I am asking no subsidy, and I would like you to examine this book (*The Farmers' Advocate*), which I am furnishing for $1 per annum.

*By Mr. Fisher:*

Q. As I understood Mr. Perrault, he referred more to Governmental reports, and not at all to such publications as may be the result of private enterprise. I did not understand him to cast any reflection upon private enterprise?—Now, if you wish to disseminate the information I have referred to, I could easily do it for a very small sum, an infinitesimal amount in comparison. My paper now is established seventeen years. It has received no subsidy, and is as free as I can make it from party lines. It is devoted entirely to the benefit of agriculture. If you were wishing to give any information in regard to the Bureau, I would give it here in pieces, according as we may deem it necessary to feed the farmers with it, or I would place a separate sheet with it in the paper. I would do it at the actual cost of paper and printing, and without profit. In regard to the distribution of seeds and plants which you speak of, I think it is far better to leave that in the hands of the seedsman and nurseryman. The distribution was tried many years ago in Toronto, and it failed.

W. H. LYNCH, of Danville, P.Q., called and examined.

*By Mr. Fisher :*

Q. I would like you, Mr. Lynch, to give us an idea of what can be done by a Central Bureau, such as we are talking of, to encourage and help the manufacture of butter in the country ?—From the experience I have had, I believe it would be impossible to fully estimate the good that would come from the establishment of such a Bureau, in connection with even this one industry. The dairy industry is in a peculiarly bad state—a fact acknowledged everywhere ; but there is a disposition all over the country, as I can show by a great deal of documentary proof, to look upon it as a possible large industry, as a specialty for the country. In other words, the industry is becoming very popular, and I think it is the opinion of many leading men throughout the country that the Government has a work to do in regard to it, and any help given to it would be popular. I have attended dairymen's conventions for the last three years, and there has hardly been a convention that has not adopted a resolution asking something from the Government. The precedent for Government action is certainly not wanting. Denmark, which now has the acknowledged highest place as a producing country in this line, and in consequence has a large export trade, has attained this position by Government action. It will be seen by reference to documents bearing on the question, that for fifty years Denmark has been, through the Government, giving great attention to this important industry. The assistance has been given in an increasing ratio. During the last few years they have been giving more attention than ever to it. The results of the work in Denmark are that they now ship butter to warm climates, where other countries find no foothold. In Ireland, the action of the Government, combined with that of private enterprise—or, as one may say, through the patriotism of individuals—the industry has been improved, by the aid of a travelling dairy, which has left its track wherever it has been. In Ireland at one time they made an excellent article of butter ; there was everything, too, to show that the country was adapted to butter making ; but owing to the change in modern living and the progress of events, it came about that rich butter was left in the market. Now, however, it is taking its place again, doubtless largely through the help of the travelling dairy. The work done in England has been productive of good results. And wherever there has been anything done by the help of a Government which could not have been done by individuals, the results have been more than commensurate with the cost. In our Province of Quebec, one of the best things the Government has done for some years has been, in my opinion, the encouragement of this industry, and the results are observable all over the Province. When Prof. Sheldon was brought out to St. John, New Brunswick, last fall, it was supposed that he was going to introduce something new to the country. His intended visit was advertised far and wide, and people went to St. John from all parts, even from Ontario, to see him. One of the instruments he showed was a centrifugal machine, what was generally supposed to be a new feature. But it was found that we had several of those machines in Quebec, and two of them were away up in the Sauguenay district, where it was supposed that there was nothing but blueberries. Thus, Quebec was found to be to the front. There has been an agitation in the Maritime Provinces with a view to fostering the industry, and the result is that they have finally determined to do what they can to further it by Government action. A difficulty stands in the way, however, as I can show by one or two letters I have, and that is the question of means. This simply points to the necessity, in my mind, for Dominion action, because where the need may be recognized provincially, it may, for one reason or another, not be carried out. That leads me to this point: that the Dominion can do once for all what each Province would have to do separately, and what each Province might neglect to do owing to its conditions. I cannot speak in too emphatic terms of the importance of the Government doing whatever it can to further agricultural industries—all branches of them—and I think that the general opinion of the farmers will be that the results will be manifold, and the expenditure one of the best that can be made. I admit that there is an opinion abroad that there are useless expenditures in the way of Government action, Agricultural Councils, and so on. To give you an illustration of the way in which this opinion is held, I may say that just before our Dairymen's Convention a leading farmer began to oppose the grants by Government in aid of agriculture. I said to him, "Did you ever think what a small proportion of the Government expenditure is in this direction? Did you ever make a comparison between the results in this direction and the results in many other directions?" He then admitted that it was really a foolish thing for a farmer to be the first to find fault with a Government expenditure for the furtherance of agriculture. He was one of the leading farmers in our district. I find there is a feeling in our country, whatever there may be in the States, in favor of expenditures by the Government in whatever way seems feasible to further agriculture. I do not know but that I have gone beyond the question.

*By the Chairman:*

Q. I see by the report of the Agricultural Commission in Ontario that by the action of the Danish Government the price of butter increased a good deal; that the butter produced in Denmark has risen in price 5 cents a pound; do you believe there is any truth in that?—It has been the result wherever it has been tried, to my knowledge.

*By Mr. Fisher:*

Q. Did it not effect that in Quebec, in consequence of the action of the Agricultural Council in regard to cheese making, and is it not a fact that to-day there are cheese factories established there where, fifteen years ago, there was no cheese made, and that the production of cheese throughout the Province has increased enormously?—Yes, it is a fact. Farmers formerly got such a little return from their cows that it was considered hardly worth while to keep cows. But now they feel they are growing comparatively rich. The simple grant of $1,000 a year to the Dairymen's Association has led to a large improvement in the factories which are established. By having conventions to disseminate knowledge and by publishing the report, a work of great value is done. The reports are considered of great value, and the dissemination of the knowledge gives the farmers a disposition to adopt new methods. Any one who would have gone to the Richmond Convention a week or two ago and had seen the interest taken by the farmers, and had heard the determination that these conventions must continue, so that they could get further information upon their avocation, would not for a moment question the desirability of that expenditure, were it a hundred times what it is. The portion of the Government grant going to that convention was $1,000; the rest is provided by private energy, individual enthusiasm—and the result of the outlay is good.

*By Mr. Fisher:*

Q. Do you not think that the action of the Government of Quebec has been largely instrumental in bringing about that change?—It certainly has. It seems to me that the present condition of the dairy industry in Quebec, referred to a year ago by the Toronto *Globe*, is assuredly owing to the action of the Government in appropriating a certain amount—I think it was $5,000—in its interest. This impetus given by the assistance of the Government has led to the formation of the dairymen's association. This association has done a good work, and a work that is regarded as valuable to the Province. I have but one opinion about this, and I find that there is no well sustained opinion in the country, no general opinion opposed to this.

Q. Now, can you give us any idea of the action you would expect such a Bureau to take in regard to butter dairying especially? What would be your course of work?—I made a proposition before another Committee, and it is the outcome of my experience, of consultations with professors from both sides the line, of observations at the dairymen's conventions, and of conversations with the farmers. My proposition was that the Government establish a Bureau—a dairy-interest Bureau, if you like—in connection with the Department of Agriculture. Through this Bureau the details of Government action could be worked out as they could not be worked out in any other way that I can think of. There are many ways in which it might be worked out. A part of this proposition was that a grant might be made of $100, for instance, to each dairymen's association that might be formed with a minimum membership of say 100 persons, and an annual fee for membership of say 50 cents. The Bureau, having its properly qualified officers, lecturers, professors, or whatever you may call them, could supply a professor or lecturer to the annual meetings of these associations. The professor's expenses would be reduced to the minimum, because the conventions could be so arranged as to be held in regular order. The Government could also have an official shorthand reporter to attend each of the conventions and to prepare a report. Each one of the reports would contain most valuable matter. There might be repetition in them, but a digest of them, that is, of the reports of all the conventions in the Dominion, would be one of the most important and valuable works in connection with the dairy industry, and the branches of farming that are connected with it. It would be a most valuable report for dissemination throughout the Dominion. And the objection that might be urged, that they would not be read, is set aside by the fact that they would be sent to the members of the convention who had been at the convention, and who, having got interested in the subject, would look eagerly for the report of the meetings. I can conceive of no better way in which the experience and wants of the farmers could be drawn out and in which prompt discussions upon them by the professors could be obtained. Then the reports being circulated, the result would be so great that the expense would be in comparison a mere bagatelle. Another way in which the Government could help is by having model butter or cheese factories. The advantages of such factories are already recognized to such an extent that the Ontario Government has decided upon establishing one. If such a factory is good for Ontario it is certainly good for the other Provinces. But some of the Provinces—take, for instances, Prince Edward Island—cannot, if they would, go to the expense that Ontario can go to. Now, the Dominion Government could do the work once for all, for all the Provinces. The model factory—model dairy, if you like—would, in the first instance, be a place to which anyone wishing to start a factory, would go for information, to see the thing in actual working, and to study the most advanced methods in the world. Another thing—it would be an experimental work, keeping in advance of everything else. It would solve the different problems connected with making the milk into its several products, or it could send out lecturers and travelling dairies; the latter passing through different parts of the country would be very helpful. Now, private enterprise cannot do all this; it has quite enough to do outside of all this, and I think it too bad for such work to be left alone to private enterprise. If I may be permitted to speak of my own work, I may say that it has been a matter of private enterprise. I have worked for three years in this way for my own private purposes and objects, and while I have had no return direct, there has been a large result in the agitation of the question that has been good for the country. But that was not my object or my purpose. Is it fair, in order that I may succeed in my private enterprise, that I should have to do an amount of educational work and to prepare the way for others? I have tried to get capital associated with this object; capitalists admit that it is a good field and a desirable field; but they say the industry is in such a peculiar state, such a bad condition, and the farmers will not buy the appliances they ought to buy, because they have been swindled so much that they will not readily go into it. Now, is there not here a field for Government to do what private enterprise cannot be expected to do? Should not Government pave the way for private enterprise, by adopting some such means to improve the industry as I have indicated. Some people ask what would be the result of such work, but we cannot fully estimate it.

*By the Chairman:*

Q. What is the loss suffered by the farmers on account of the inferior quality of the butter made in Canada?—I have estimated the loss at $5,000,000 annually, upon the basis that 50,000,000 pounds are produced every year. When you come to take all the conditions into account and consider what has been done for the sister industry—the cheese industry—the loss upon butter making must be something like $5,000,000 annually. But the 50,000,000 pounds does not represent the entire manufacture in the Dominion. I saw somewhere that it was 100,000,000. It is estimated that the production of butter in Ontario alone is 50,000,000 pounds. The Treasurer of the Province said, two years ago, that it was 50,000,000 pounds of bad butter. But I do not agree with that statement, in the strict sense. There is a good deal of our butter that is consumed fresh, and a large portion of it is good. It would not be good if it was salted, packed and shipped a distance, but so long as it is consumed fresh it is good butter, and serves all the essential purposes of good butter. Consequently, it will not do to say that, because nine-tenths of the butter that finds its way into the market is bad, nine-tenths of the butter produced is bad. So I modify that estimate and say that not 50,000,000 pounds of butter produced in Ontario is bad, but that 50,000,000 pounds of that produced by the whole Dominion is of inferior quality. And surely, if some estimate the inferior butter at 50,000,000 pounds for Ontario alone, I can safely base my estimate upon 50,000,000 pounds in the whole Dominion not being what it ought to be. In view of that, there can be no doubt that the pecuniary advantage of improving our production of butter will be not less than $5,000,000.

*By Mr. Fisher:*

Q. I do not suppose it is likely, if the whole product was improved in quality, that the price would increase in proportion. The people would get a better article, but I doubt that the price would increase in proportion to the quality?—No; but there is very much sold to-day at less than people would give for good butter. Then, again, if the butter were good the export of butter would be very much greater, the business would then be profitable, and the profit arising from the profitable production of butter would lead farmers to adopt better methods and to cheapen the cost of production. Thus, in the end, though the price of the butter might not be very much greater, the profit would be larger.

Q. It would also meet the competition of oleomargarine, which now competes with bad butter, but could not possibly compete with good butter?—Yes; that is another feature. I would say further, in connection with this subject of Government assistance, that on my way to London from Toronto, I met a leading member of the Ontario Legislature, a gentleman who has had an official position in the Dairymen's Association and is a large cheese manufacturer. Speaking of the recent Government action there and the good results that were already evident, he said: "Anything that the Government of Ontario can do in this direction certainly will be done." He then referred to some injury done in connection with wheat growing, by the rust, or insect, or something of that kind, of recent occurrence, and said: "Just think what an advantage it would have been to the Province to have had some light thrown upon that, so as to have averted the evil." Then, at the convention it was stated by the present President that it had been intimated to him by the Government of Ontario that the expenditure had been so satisfactory in its results that they could have whatever money they could use—"call upon us for more if you need it; we consider it money well expended." He gave that publicly to the convention. It was a sentiment that was applauded. I find many such evidences of the satisfactory results of the expenditure in this direction by Government.

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MR. JAMES FLETCHER, of Ottawa, Vice-President of the Entomological Society of Ontario, called and examined.

*By the Chairman:*

Q. What experience have you had with reference to the study of entomology, and especially as regards its connection with our agricultural interests?—I have been studying Canadian entomology, especially the economic aspect of it, since I have been in Canada, that is, since 1874. Of course, the chief object of all entomologists, in a new country especially, and particularly in Canada, is to give our studies a practical turn, so that they may be of use to the community at large. We, having studied the science of entomology or the study which treats of insects and the injuries they commit on the crops, wish to make our labours as popular as possible, and to make them as well understood as possible by those people to whom they are of most interest. The farming community is spread over a very large tract of country and is in many respects the most important portion of the whole population. The great source of wealth in a country is the produce that is to be got from the soil. In fact the produce of the farm forms a very large and important part of the produce of any country. The least estimate we can put the value of the annual crops of Canada at is about $200,000,000. I have estimated this from the Census returns, and I think it is the very lowest figure we can put it at. Now, all our crops are simply decimated every year, at least 10 per cent. of them is lost. Many crops are half loss, and in some years others are not worth harvesting.

*By Mr. Fisher :*

Q. In consequence of insect ravages ?—Yes ; my remarks will all apply to the ravages by insects. During the past year or two a serious insect enemy has appeared in the clover crop—the clover seed midge (*Cecidomyia leguminicola*). Perhaps it is the most serious insect pest the farmer has, at the present time, to contend against. I notice in the replies to the question in the circular sent out by the Committee: "What crops and fruit products have suffered most, and from what insects or birds?" that some farmers say the whole of their clover crop was simply lost from this one insect. Now the loss to crops is caused, not by large and conspicuous insects, but by insects so small that they are not noticed ; and I have no hesitation in saying that if you were to ask twenty of these farmers to what they attribute the loss, half of them would not know that the insect was at the root of the trouble. Some would say that the seed did not mature ; some that it was the blight, and some that it was not a good season. But when we come to investigate the loss, we find that it is caused by this one insect. It is a small fly that lays an egg in the flower of the clover. This egg hatches into a small maggot which entirely consumes the seed. It is small and inconspicuous, and is not noticed except in its effects. It is insects of this kind that entomologists would be useful to point out. It is not the large insects that do the damage. For instance, the larva of the moth (*attacus cecropia*) that destroys our apple trees—the caterpillar, is from four to five inches in length ; it is as large as your finger and very conspicuous indeed ; it has never been injurious, because it is easily seen and destroyed. Besides, the instinct of the moth is such that it does not lay so many eggs on one tree that there is not sufficient foliage to feed them on. It is the inconspicuous insects—the insects that are not noticed that are most destructive. It is the same with the Hessian fly (*Cecidomyia destructor*) and the wheat midge (*Cecidomyia tritici*). The wheat midge, some years ago, destroyed in one year $8,000,000 worth of wheat in Canada. The Hessian fly destroys enormous quanties of wheat. The clover seed midge I was drawing your attention to just now, is doing great damage at present. The army worm is a more conspicuous insect ; but the chief reason it is so injurious is that it does not appear regularly. It may appear one year and sweep everything before it ; then it does not appear for some years. Now, it is found by entomologists that the circumstances most advantageous to the production of large quantities of the army worm are a dry autumn and a damp season following, which produce a luxuriant growth of vegetation. Thus their *habitat*, or the place where the circumstances most advantageous to their growth and increase, is extended. These places are in low grounds or damp places. Now if these *habitats* are extended over the whole country by atmospheric circumstances, the moth migrates from its own special restricted *habitat*, and covers the whole country. Under favorable circumstances, it increases in enormous numbers and sweeps everything before it. One of the chief objects of the scientific student is not only to detect the moths or insects which injure our crops, but to find out some remedy for them, the most economical remedy, and the best way of applying it. Perhaps this is not the place to mention it now, but the best remedy for the army worm has been found to be, to dig trenches. The worms are processional. They march in armies, devouring everything they come to. It has been found that by digging a trench about one foot deep, and putting in a poisonous substance, such as tar or coal oil, they fall into these trenches and do not get any further. Now, then, permit me to say a word as to the feeling with regard to entomology. The object with which I took up the study, certainly began with the interest I took in the insects scientifically; but the economic interests, the interests in which the farmers and those engaged in cultivating the soil are concerned, are so absorbing that when anyone once takes up the study he will be induced to carry it on, with an eye to those interests, if for nothing else. At any rate, that is the case with entomologists I have been brought into contact with. You are all familiar with the name of Prof. Saunders, of London, of whose entomological work this is a copy. (Presenting the Chairman with a copy of Saunder's "Insects Injurious to Fruits.") He began studying entomology some years ago. For many years he has devoted a great part of his time to studying the insects which are injuring our crops and particularly our fruits. He is not, as some of us are, only a scientific student; he is engaged in large fruit-growing operations; also, in agricultural operations, and is, besides, eminent as a chemist. He has been engaged in the garden, the fruit garden, the orchard and the field; and has paid particular attention to the injurious insects. In Western Canada, there are, I think, more species—different kinds of insects—than we have here. The climate is more equable and the insects develop more readily there than here. But for all that, every part of Canada has its special injurious insects and it is a necessity that every farmer should pay some attention to them. One of the most remarkable things is the ignorance on the part of the farmers on this subject. There is no class of the community in Canada so interested in these insects as the agricultural class. In making such inquiries as it has been possible for me to make—and the same feature is noticeable in the answers to the circulars sent out by the Committee—I have found a most remarkable inconsistency among the farmers on this subject. In some of the answers to the circulars you will find them saying that although they have lost the whole of certain crops from insect ravages, yet they do not consider that a state entomologist will be of any use to them; and the question which calls forth this opinion expressly states that the duties of the entomologist shall be to give information concerning insects, injurious and beneficial. There is no doubt of this, that unless one makes a scientific study of these insects any information he may give is utterly useless. The insect is not really so injurious in its perfect state. It is in its embrionic states that it is most injurious, one of the chief sources of danger being that we do not notice it. For instance, the Colorado potato beetle—although that insect eats the foliage of the potato, the chief injury that is done to the pototo is by the larva. It is in the stages in which they are not recognized that the insects do the most damage. And it is only the entomologist, who will study the insects closely, and give a great amount of attention and time to them, that can detect them in their different stages, and recommend and apply the remedies for them. The economic entomologist should first study the foe he has to fight; for if he does not know who and what his foe is, he cannot fight him. We may say, in general terms, that insects pass through four stages; the egg, the larva, the pupa or quiet stage, and last of all, the perfect insect. The egg, of course, is the source from which the young insect comes. Then comes the active stage, in which it consumes and locks up a store of nourishment. Then comes the pupa or resting stage, during which there is very seldom any food taken. In the *lepidoptera*—the moths and butterflies, those which have conspicuous wings, and in the *coleoptera*, the beetles with hard sheathed wings, there is a quiet resting stage. Then follows the perfect insect, the chief object of which is to perpetuate the species. There are very few classes of insects which do harm to crops in their perfect states. It is in their larval state that we have to fight them. The economic entomologist should first learn the condition of his enemy and then bend his efforts to discover the most economical and convenient remedy that can be applied. Paris green is now one of the principal remedies used. It was discovered as an insecticide by an entomologist in the United States, about 1869. Paris green is a specific against all insects. It is poisonous to everything; and the only objection to it is that this same poisonous quality might turn against ourselves. But with care, there need be no danger at all. It is a combination of arsenic and copper, and is known to chemists as an arseniate of copper. In its pure state it contains about 58 per cent. of arsenic. Of course, in using any remedy we should know what we are using. If it is pure it should contain 58 per cent. of arsenic; if it is not pure you cannot apply it with the same results, for if it contains only half the amount of arsenic, the ordinary application will not be efficacious.

*By Mr. Landry:*

Q Do you mean the arsenic itself or the arseniate?—The arseniate. The Paris green, as I was saying, should be pure, or else you cannot rely upon its effects. Now, in using it, we have found it convenient, in fact necessary, to mix it with certain substances that we call diluents. The most advantageous of these is, perhaps, common flour. It is advantageous in this manner. The poison is applied in two different ways, both wet and dry. The dry mixture is considered to be the better by some. It has its advantages and its disadvantages. The particles of flour being very small and the granules of this green poison being very small, too, they mix easily; and thus the volume is very much increased, while the amount of the poison which falls on the plant is not sufficient, if properly diluted, to injure the plant. If the poison is put on too strong it will destroy the foliage and do as much injury to the plant as the insect will. Of course, everyone connected with agriculture will know of what importance leaves are to the plant. The functions performed by leaves are in general terms, to breathe from the air a certain part of the food of the plant; they act in almost the same way as lungs in animals. They breathe from the air certain gases that are mixed with other certain gases taken in by the roots in the shape of water, and from these the substance of the plant is built up.

Q. Especially the underneath part?—Yes; certainly. There are ducts through which the gases are taken into the body of the plant, and are there assimilated; then certain gases are returned again to the atmosphere, as, for instance, oxygen. Vegetation is the only means through which pure oxygen is produced in nature. The beautiful balance kept up in nature between vegetation and animal life is a matter of wonder and admiration to every one who examines it. Plants breathing the air inhale carbonic dioxide, a poisonous gas formed by animals in the process of breathing. This poisonous gas is the chief source of growth to the plant. So that the plant breathes the poisonous gas and exhales oxygen which the animal requires, and which the animal returns again to the air, charged with the poisonous gas which the plant needs. But we were speaking of the diluent for Paris green, and I mentioned flour. I have said that flour is the most advantageous to use for this reason it mixes readily with this poison. But in addition to this, when it is distributed over the plant it adheres better than some of the other diluents, forming a paste when moistened either by the dew or rain. The poison then remains for a longer time on the plant. This is one of the chief arguments in favor of the liquid mode of applying this poison. It remains, until the flour dries, in a sort of light coating over the whole plant. This poison—arsenic—takes a long time to lose its property. In fact, it is only after some months, when it goes into the soil and is acted upon by other chemicals that it is rendered harmless. The best results have been obtained by the use of flour in all parts of Canada, because it adheres better than other diluents—and more than that, it is more readily eaten by the insects. For instance, plaster of Paris, which can be very finely pulverized, has been used; but it is not so good as flour, as it is not eaten so readily by the insects. It is true the plaster of Paris has certain fertilizing effects upon the plant; but these are very small. And then the sole object of placing the poison there, is that the insects may eat it. A very useful mixture is one of Paris green and twenty of flour. Plaster of Paris is less expensive than flour, and is slightly fertilizing. In its use you can take fifty pounds of it to one of Paris green.

*By Mr. Fisher:*

Q. Seventy-five pounds are used?—In using 50 pounds I have found no injury to the foliage. I have no doubt it may be increased up to 100, and with the young larvæ, I have no doubt it may be increased up to 150 or 200; but then it requires a great deal of knowledge of the habits of the insects, and careful watching to know the exact time to apply it. Of course, all insects are much more delicate when they are young. I have thought that, perhaps, the most injurious insect to the apple in Canada, after the codling moth, is the oyster shell bark louse. (*Aspidiotus conchiformis.*) The reason for this is because it is so inconspicuous that it is not noticed. Among fruit growers and those who have orchards it often passes undetected. There is hardly an orchard around Ottawa—of course, this is not a good fruit growing country, with the exception of grapes—where you cannot find the trees dreadfully covered with this oyster shell bark louse. The insect is so small that unless you have some knowledge of insects you do not recognize it as an insect at all. It belongs to the *Hemiptera*. The male is a little winged fly, but the female is simply a scale which covers a large number of eggs. Very little is known of these insects; but Prof. Comstock, when State Entomologist of the United States, gave a great deal of study to them, and published a very able report upon them. His studies are particularly thorough and valuable. Moreover, our own Mr. Saunders has paid a great deal of attention to them. The theory concerning these insects is that after fertilization the body of the female gradually dries up and leaves simply the eggs remaining beneath a scale, of which there are a great number. The skin or shell then remains as a cover to the eggs, which are thus protected during the winter. Now, it is very hard to apply any remedy that will penetrate through that skin. It was considered, until Prof. Comstock examined the matter, that it was, in fact, impossible to get any substance to penetrate through this scale. In the early spring the end of the shell is pushed up, and the young plant lice lying hidden there, emerge. They then move up towards the young twigs or shoots, and there they penetrate the bark with their beaks and suck out the juice from the stem. The insects go through their regular cycles of existence. They increase enormously, the proportion of females being much larger than that of the males. They cover up the whole of the young growth; they suck the sap from the trees, and it is thus injury is done. The chief source of that injury is as before, that they are not recognized, and consequently left alone. It is satisfactory to know that Prof. Comstock, after making many experiments, has found that the best remedy that can be applied is what is known as a "soap wash" made of common soap. By using the word "best," I mean not the most efficacious, exactly, but the remedy which is most at hand, and the most convenient for every one to use. The soap wash should be thrown on the plants during the month of June, when the insects are tender and are easily killed. Prof. Riley, who has done a great deal for economic entomology and whose writings are of the highest value—in fact, this gentleman has done, perhaps, more than any one else in the United States in investigating injurious insects—found that coal oil, in its different forms, may be used very advantageously in fighting these insects. Of course, the oil will not mix with water easily; but he has found, after many experiments, that an emulsion may be made by mixing the coal oil with milk, and that this, when once mixed in the proper porportions will to a certain degree, mix with water. In this way he has found that it can be applied to the plants in such quantities as not to injure the vegetation, yet to be strong enough to penetrate the scale and kill the insects. It is only a few years since this was discovered. If it be applied, I have no doubt at all that in a few years we shall be able to combat the oyster shell bark louse successfully.

*By Mr. Landry:*

Q. The soap wash, I suppose, acts upon the caterpillars?—Yes: the alkali in the soap will destroy nearly all insect enemies. The soap wash, as I said, is the most convenient. A cold, saturated solution of washing soda, with soft soap, of the consistency of paint, applied to fruit trees, will prevent insects depositing their eggs on the bark. The apple trees suffer from borers, that bore into the bark and feed upon the vital portion of the tree. The borers deposit their eggs upon the bark; the young larvæ penetrate the bark and feed upon the cambium layer or sap-wood of the tree. In some instances they girdle the tree, and so prevent the sap, and the tree dies. Now, to prevent these insects from laying their eggs on the bark, one of these deterrents must be used, and the soap wash is the most convenient and useful. If the soap wash is mixed with soda in proper proportions, it forms a coating for the tree which is not easily washed off by the rain, and which will prevent insects from depositing their eggs there. The inconspicuous insects are the chief source of our injuries, and it is only the entomologist, who is led to study them and know them in all their different stages, that detects them. It is all very well to say that any one can apply Paris green to his potatoes. Yes; but who was it that found it out? Who discovered that it was the most convenient poison to be used? The Entomologis, after much study

*By the Chairman:*

Q. Who discovered the use of it?—I know when it was discovered, but I do not know the actual name of the discoverer.

Q. Was it not Prof. Riley?—I think not himself. I think it was discovered as an insect poison in 1869, in Illinois. The first mention of it was in a newspaper as being used by some one in Illinois. Prof. Riley then took it up. But it was an entomologist who found it out, after using a great many other substances. There is another composition that has arsenic in it, known by the name of London purple. Many people are in favour of it, but I think, on the whole, Paris green is safer and surer. It does not do to play experiments, when you know a certain substance is a remedy, in such an important matter as this. This London purple has been found useful; it is a waste product produced in the manufacture of analyne dyes. It is a composition of arsenic and lime, and is known as an arseniate of lime. It is much cheaper, because it is a waste product, and should be produced at a very little above the cost of carriage, because, being a waste product, it requires a great expenditure on the part of the manufacturer of analyne dyes to get rid of it. Prot. Riley, in the States, praises this substance very much. He says that its cost, contrasting it with Paris green, per acre of cotton, should be only 5 cents instead of $1. It is possible that this may be too favourable a view. But, at any rate, it is a useful poison. Prof. Saunders, of London, who is certainly one of the most thorough entomologists on this continent, and is recognized as one of the best men we have, being also a practical chemist, has thoroughly investigated the matter, and he says he does not think it would be safe to use London purple as the chief remedy. Being a waste product, the proportion of arsenic or poisonous property in it is irregular, and is not to be relied upon. The cost of Paris green, to be safe, should be 50 cents per pound.

*By the Chariman:*

Q. What loss do you estimate is caused annually by insect ravages?—Taking the average annual produce of Canada at only $200,000,000, which is the lowest possible estimate, I think that the lowest estimate we can put the injury by insects at, taking the average—and it is far below what is actually the case—is $20,000,000.

Q. Would it be advisable to have a Government entomologist, and give your reasons?—There a great many. I believe that a Government entomologist would be a most useful officer of the State. He could give most useful information. But whether it would be wise to advise the appointment of a State entomologist at the present time or not, I do not know. It would require a certain amount of expenditure, which, perhaps, the Government might not be inclined to go to just now. That such an officer would be useful, there is not the shadow of a doubt. Let us look at it in this way. The United States Government is certainly not a Government to waste money upon a useless officer, but the United States has done more to support the service of entomology, and the study of economic entomology than any other country. If the expenditure thus entailed were useless, the United States would not be the country to enter upon it. Congress gives large sums every year to the entomological branch of their Department of Agricultural, and many of the individual States have also their State entomoligists. Now, with reference to the appointment of a State entomologist, I do not know that I can quite advise that step just now

There are only one or two men in Canada that would be fit to take that post and who would produce, in the first report, such results as would convince the whole country, and particularly the farmers, that the expenditure involved was justifiable. The man most capable is Mr. Saunders, of London. There is Mr. Bethune, of Port Hope, also a very eminent entomologist, but we all consider that Mr. Saunders is far ahead of everybody else here. He is, and has been for some years, the President of the Entomological Society of Ontario—of which I have the honor to be Vice-President,

*By Mr. Landry:*

Q. Does he live at London or Toronto?—He lives in London, Ontario. I believe if he could be induced to take that position he would be able to make such a report that the farming community, in general, would be persuaded and convinced that the expenditure incurred in entomological investigations would be a good one.

Q. What suggestion could you make; what action should the Government take?—We have now in the Department of Agriculture, as its Deputy Minister, Dr. Taché, who is a man of great learning and intelligence. He is read in entomological matters and has published a very valuable pamphlet on the potato beetle. It is the best work we have on that insect. Unluckily, it has only appeared in French; possibly it will appear in English also, in which case it would be of very great value to the whole farming community. Certainly, the potato bug is now pretty well in hand, by the advice of the entomologist being followed, and we should not fear any more of it as a serious pest. But I think, as I say, we have already existing a Department of Agriculture, with a man at the head of it fitted to carry on, or to direct, entomological studies. I believe there is no branch of science of so much direct use to the country at large as these entomological studies, because insects are so numerous and because they attack every plant we wish to grow. I believe the estimate has been made that every plant has an average of six insect enemies. This is stated in the report by Dr. Lintner, the State entomologist of New York State, in his most valuable first report on injurious insects in New York. I believe there is more information in that report than in any other work on insects, of the same size. Moreover, he gives certain preliminary chapters, in which he deals with primary subjects. He gives the importance of entomological study; then he gives the extent of insect depredations, and then a list of insects. I will just give you two or three facts, well authenticated, which he has collected in this book. He states that in 1857, speaking of the wheatmidge, it extended its ravages over a large portion of New York. In 1854 the loss was 15,000,000 bushels in consequence of its ravages. In 1857 it exceeded that. In Canada that year it destroyed 8,000,000 bushels. Now, if we put wheat at $1 per bushel, then you see there was a loss of $8,000,000. There is no doubt very little information could be got as to the exact loss at that time, but if a true return could have been secured it would have been found to be in excess of that.

Q. Do you think the Government should try to have a report on injurious insects and distribute it among the farmers?—I do, Sir. We have a Bureau of Agriculture already existing. We have a man who is fit to direct entomological studies at the head of it, and to begin with, if it is thought that appointing a State entomologist would require too large an expenditure, if a certain small amount of money were put in the hands of the Deputy Minister of Agriculture he might distribute it among already existing societies, with good results. We have in Canada four or five societies. Starting from the west we have the society which is doing certainly more work than any other society in Canada—the Entomological Society, of Ontario, This society is liberally subsidized by the Ontario Government, and makes to them every year a report, which is published in the Agricultural and Arts Report. Then we have the Toronto Natural History Society, with good entomologists belonging to it. We have here at Ottawa the Ottawa Field Naturalists' Club, a very active club. Then going to Montreal, a branch of the Entomological Society of Ontario, and the Montreal Natural History Society, with Mr. W. Couper, an active entomologist, as member of both. In Quebec we have the Quebec Literary and Scientific Society;

we have also there one of the leading entomologists in Canana, L'Abbé Provencher, a man who has worked hard from year to year in the interest of the science. His paper, the *Naturaliste Canadien*, he has published at great loss. From his small stipend as a priest he has taken as large an amount as possible; he has only saved enough to live on, and the rest of his money has gone into his paper. Unluckily, the Quebec Legislature has taken away the small grant they gave him, and the paper has had to come to an end. The Province of Quebec has also suffered great loss by the stoppage of L'Abbé Provencher's work. But to proceed, at Halifax and St. John they have already existing Natural History Societies. These societies, I am sure, with a very small assistance from the Government—and, in fact, they would without any assistance at all—would make a report upon those insects in their districts that may be found to be injurious. If a small grant were given to these societies, it would be a necessity for them to do something. If a small amount were given to them, if only with the object of purchasing apparatus, it would be a help, for, of course, apparatus is necessary, and their studies require a great deal of time, while the information must be gathered from all parts. I believe that if a certain small amount were placed in the hands of the Deputy Minister of Agriculture, he might be put in the same position as the Commissioner of Agriculture in the United States. There Prof. Riley is the entomologist, but his department is only a branch of the Bureau, and the Commissioner of Agriculture exercises control over it. Dr. Taché might direct the small subsidies to be given to the Societies, and require them to forward to him their report. These could then be consolidated into one report from his Department, upon injurious insects and the remedies for them.

Q. Do you think farmers in the United States have derived great advantages from the appointment of entomologists?—I do, indeed; particularly with reference to the potato bug and this bug will be stamped out, so far as Ontario is concerned, if the advice given by entomologists is carried out. Another insect that does great injury and destroys millions of dollars of produce is what is known by the name of the chinch bug. It is one of the most injurious of its order, namely, the *hemiptera* or true bugs. The bugs of this order are nearly all recognizable by the disgusting odor which they emit when they are touched or handled. The chinch bug is one of the most injurious. It destroys wheat to the extent of millions of dollars. I think it was the New York *Sun* that said if the United States were to spend $5,000,000 in fighting one particular insect, which was mentioned, it would be the cheapest and most economical expenditure they ever made.

Q. You think the Government here should do something to encourage the study of entomology?—I do. I think there is nothing of more importance to those engaged in cultivating the soil than that science.

Q. You think it would decrease the ravages committed by insects?—I do. I think an entomologist would study the different stages of an insect, and find out the stage in which it is most vulnerable and the remedies which could be applied with the greatest success. Then there is another thing, one of the greatest disadvantages we have in this country, is that we cannot collect information. Nearly all the entomologists we have in Canada are engaged in other pursuits; they have their own occupations, and cannot give the time to collect information. I believe if the system followed in the United States were adopted, this difficulty would be overcome. There they issue a circular, and send it broadcast over the whole country, putting it in such language that every farmer can understand it. The question is asked: Do your crops suffer? If so, what crops, and in what manner? Have you noticed any insects? If you have not noticed them, suggest what the cause of the injury may be. Then they reply, giving a statement of the facts as they exist in their district. Of course there may be inconsistencies in their replies. I find inconsistencies in some answers to your circular. Some farmers say that a State entomologist would not be of advantage; yet, you will find those very farmers reporting that the whole of their clover crop has been destroyed by the clover midge. There is an inconsistency there. The two statements are equivalent to saying that the man who would tell them how to prevent the loss of their crops is not necessary.

The Committee adjourned.

OTTAWA, 8th March, 1884.

The Committee met. Mr. Gigault in the chair.)

Prof. P. D. PENHALLOW, of McGill College, Montreal, called and examined.

*By the Chairman :*

Q. What experience have you in the working of experimental stations?—For the last three years I have been more or less directly connected with experimental stations. Previously to that time, I had been engaged in agricultural work, more or less directly, either in the line of agricultural education or agricultural experimentation. In 1876 I went to Japan as Professor of Botany and Chemistry in the Imperial College of Agriculture, and was there four years in that capacity. On my return to America in 1880, I was placed in charge of the scientific work of the private experimental station in New York, known as the Houghton Farm Experiment Station. I was in charge of that work until I came to Montreal, in September last, where I now hold the Chair of Botany in McGill University.

Q. Can you describe the working of the principal experiment stations to which you were attached?—The experiment station to which I was attached, as a private institution, was of the nature of a large model farm, chiefly devoted, as a farm is, to the raising of produce and cattle. The introduction of the experiment department, which was the experiment station proper, was conducted with reference to the acquisition of scientific facts which might be afterwards employed and applied practically to the wants of the farm. The work which that station undertook was chiefly in the direction of fruit culture, and in that line more particularly, investigations were made into the diseases of fruit, because we were in the centre of the great fruit section, south-eastern New York. In addition to these experiments there were experiments conducted in relation to the general laws of vegetable physiology, the relations of soil temperature to plant growth, and the relation of certain fertilizers to plant growth. That is, perhaps, a general outline of the work carried on there.

Q. Where is that farm?—At Mountainville, N.Y.

*By Mr. Fisher:*

Q. It was not a State farm?—No; a private enterprise.

*By the Chairman:*

Q. What have you to say regarding the experiment stations of Japan?—In Japan they have no true experiment stations, although they have large experiment farms, which have been established with direct reference to the importation and testing of improved farm machinery, farm stock, and fruit and forest trees. These farms have been established chiefly within the last ten years, and almost entirely in the northern portion of the Empire, in the Island of Yeddo, where they have desired to make special efforts in the development of agricultural resources. There have been one or two farms established in the main island, in Tokio and vicinity, but they are more of the nature of farms subordinate to those in the north. In the north there are at least four principal farms of that character, which have all been established within the last ten years. Some of them are of very large size. One of the farms is connected directly with the Agricultural College at Sapporo, and is under the immediate control of the professor of agriculture, the relation there being precisely that which obtains here between the farm and the college in our agricultural institutions. The other farms are entirely and directly under Government management. They are under Government officials; and they have been endowed by the Government, or at least they have received a certain sum annually, which varies somewhat according to the location of the farm. A farm which was connected with the college had an annual grant of $20,000 for its support. The farm nearest to it received $40,000 annually. The largest farm of all, situated in the southern part of the island, near Hakodadi, received an annual allowance of $60,000. The works these farms have carried on have been, in the first place, the importation of blooded stock, horses, sheep, and cattle, chiefly from the United States, from which they have bred directly, or with which they have crossed their native stock, with a view directly to improve what they have already. One of their farms is especially devoted to the improvement of their native breed of horses. They have had there, for a long while, perhaps for several centuries, a very inferior grade of horse, which has been allowed to run wild in the northern island and to breed pretty much as it would. They are now improving that breed by crossing it with Kentucky stock or Arabian stock. Then another very important work which these farms have accomplished has been in the direction of importing fruits and grasses. One of the most important perhaps, is the importation of sweet forage plants. The country there is naturally devoid of sweet grasses suitable as food for cattle. It has been one of their chief objects to introduce these grasses, as a preliminary to stock-raising. Then they have imported large quantities of fruit trees. The number of desirable fruits known to Japan, before recent foreign intercourse, was exceedingly limited, and confined almost entirely to the orange and persimmon, a few grapes and one or two kinds of pears of very inferior quality, and inferior peaches. They had none of the highly developed varieties of fruit which we deem so desirable, in the way of grapes and pears and apples. Their efforts have been directed, within the last few years, to the importation of these, and the testing of them, with a view to their special adaptation to their climate. In 1871 or 1872, when this movement was first established, they established a large garden at Tokio, for the testing of imported fruit trees, and from that centre they have distributed all our dsirable fruits, including plums and cherries. Throughout the northern island of Yeddo there are now numerous, and in some cases large orchards, which have been established in this way. Not only that, but they have developed a large industry in vineyards and hop culture. There we have a very direct and valuable outcome of the work which can be performed by these experiment stations, or more properly, in this case, trial grounds. This is hardly the work of experiment stations, but more the work of testing grounds.

Q. So you believe that these experiment or trial grounds have helped a great deal to improve the condition of agriculture in Japan?—Vastly.

*By Mr. Foster:*

Q. Has there been any income from those grounds?—The time which has elapsed since the movement was first undertaken has not been sufficient to enable us to judge as to what will be the pecuniary results. Of course there has been some income, but the principal orchards are only five years old, and the vineyards, when I came away in 1880, were just coming into bearing, so that though they had five hundred acres under crop at that time, it was impossible to tell just what the result would be. The principal object in planting these large vineyards under Government control, was with a vew to making wine, but of course it is a question whether their climate is adapted to the manufacture of wine.

Q. But they have that object in view?—Yes.

*By Mr. Fisher:*

Q. I suppose they distribute these plants and trees gratuitously?—Yes; their object being to directly encourage the people in the cultivation of those improved varieties.

Q. Then the stations were as much propagating grounds as experiment stations? —Yes.

*By the Chairman:*

Q. Do the Japanese seem to be satisfied with the results obtained from these experiment stations?—I think they do. I may say that another outcome of these model farms has been the introduction of improved agricultural machinery from abroad and the fostering of native industry. The Japanese implements, like most implements in Oriental countries, were formerly of a very crude form. The use of the plough and the harrow was comparatively unknown. The plough was used to a very limited extent and the harrow not at all. The spade was not used, and the hoe was entirely unknown. These implements have been introduced, and the result of introducing foreign agricultural machinery, including reaping machines, mowers, threshers and all those implements which would apply to the operation of large farms, has been the building up of varieus establishments where these implements are now manufactured on a large scale. They have not arrived at the perfection we have reached on this side of the water; still they are making very good implements and have built up a very important native industry.

Q. Have you anything to say about the experiment stations in Germany? Do you know how many there are there?—Perhaps the best way I can answer that would be to give you a brief sketch of the institutions there, the origin of their establishments and the number. The first movement which occurred in Germany leading to the establishment of their experiment stations was brought about through the efforts of the farmers themselves. Up till 1850 there were no institutions which were qualified to carry on investigations of a scientific character which could be applied to agriculture. The farmers of certain portions of Germany began to realize that their future success depended very largely upon more exact knowledge, as obtained from scientific research. So, in 1852, in Saxony, a local Farmers Club organized, by their own efforts and at their own expense, a small experimental station. They placed that in the hands of a University graduate; I believe it was Dr. Wood, who has since given us such valuable results in his scientific work. In two years time that station had so thoroughly demonstrated its usefulness and its importance, that the Government recognized it, and not only recognized it, but extended to it every important pecuniary support. The work of that station, which was then extended, came to be recognized as of great importance to the country at large. Since then, as the results of that early movement, there have been established, within the last thirty years, over eighty of these stations. Nearly all of them receive at least a measure of support from the Government, although many of them are still largely supported by private subscriptions or local societies. I think it is exceedingly significant, as showing the importance and the value of these stations, that the farmers themselves should initiate the movement, and that it should come from them rather than from the Government.

*By Mr. Foster :*

Q. Does the Government exercise any supervision over the farms they aid?—These experiment stations, as I understand it, are centralized, to a certain extent, under one head, who is really the Government officer in charge of the entire system, and the results are largely elaborated through that central medium, although each station publishes, to a certain extent, independent reports.

Q. How does each institution keep up its running expenses? How are these provided for?—A large part of the running expenses would be made by fees which come in from outsiders for work performed. For instance, if they are especially engaged in the analysis of fertilizers or soils, the fee which would be charged for that work would be sufficient to cover the actual expenses, and so the running expenses wouldbe largely made. If it were not for that, the endowment which these institutions now receive would, in many cases, be inadequate, because the amount of money appropriated to them ranges from a few hundred dollars only, up to several thousands—I believe $10,000 is the highest annual grant—the amount of money of course depending upon the work to be performed and the number of assistants and directors requisite for its execution.

*By the Chairman :*

Q. Do you know what the annual running expenses of these experiment stations are, and what aid is given to each by the German Government?—I could not say exactly; but perhaps the allowance which they receive would not be so applicable in meeting the requirements of stations here, as would the grants to stations in the United States.

Q. Is agriculture in a very advanced condition in Germany?—So far as I know, it is as advanced, if not more advanced, than in any country in the world, and this is largely the direct result of the work of these stations. These stations have given material which is not only of the highest scientific value, but of the highest value, in the direct promotion of agriculture as a science; indeed we can attribute to this work almost all the exact knowledge we have at the present time concerning the careful breeding, managemement and feeding of stock, the growth and nutrition of plants, the special requirements of plants, the adaptation of plants to soil, the sources of plant food, and other questions of a similar character, which are exceedingly numerous.

*By Mr Fisher:*

Q. As a rule, I believe each one of the agricultural stations in Germany takes up a specialty and works it out alone?—That is the system upon which they are organized. In order that no station shall repeat the work which has been done by any other, each station has a special line of work. Out of the eighty stations they have, there would be, perhaps, half a dozen—I cannot give the precise number—devoted to each subject. Half a dozen would be devoted to the study of the distribution of forest trees, the special study of the diseases, weed and vegetable, which attack them, and the special methods which may be employed for preserving the forests against their ravages. Other stations are devoted entirely to the study of fruit trees, not only with reference to their desirability, but their adaptation to climates and the diseases to which they are subject—a question which, at the present time, is an exceedingly important one and is likely to become much more important in the near future than it is now. Others are devoted entirely to the care, management and feeding of stock, and to stock-breeding. Others are devoted to the analyses of fertilizers, and to soil analyses, so that is the way the work is divided up. Men of special qualifications can be put in charge of these stations, and they can bring out the best quality of work, which would not be possible if all these subjects were combined in one station.

Q. Is there any special Bureau which collects and systematizes the reports of these different stations and publishes them in one volume?—I cannot say exactly about that, but it is my impression that the work is centralized in a Bureau. It is more or less centralized under the control of one Government officer; and it is my impression that it is centralized in a Bureau—a Department of Agriculture.

*By Mr. Foster:*

Q. Do you know by what methods the knowledge gained is disseminated?—By means of annual reports, entitled Reports of the Experiment Stations. Those reports embrace only the most important portion of the work done; they embrace that which may be regarded as established. In other words, it includes what would be the foundation of laws on different subjects. Aside from those reports, a very large amount of information is distributed also through the medium of bulletins, which are issued at frequent intervals, as material is collected and occasion may demand. But the material which goes into these bulletins is carefully regulated and nothing is allowed to go into them which should more properly go into the report at the close of the season. The material which goes into the bulletins would be more in the nature of information to meet immediate requirements, as, for instance, the analysis of a given fertilizer, the analysis of a given soil, and such other things as the farmer would require immediate information about. Nothing is allowed to go into them beyond that.

*By Mr. Bain:*

Q. Do they allow any students at these stations, or is their whole work done through reports?—Their work is done through their reports. They have students, in a sense; that is, they have students as assistants; but they do not undertake any educational work, properly speaking.

Q. Do they systematically take parties in training as assistants or only just casually?—Only casually; they depend upon men who have already received training.

Q. And their reports are supposed to be the only means by which they communicate the information they obtain?—Yes.

*By Mr. Fisher:*

Q. There are agricultural colleges in Germany, are there not? Is there not one at Hoenheim?—Yes; they have agricultural schools in Germany which perform the same functions as agricultural schools in the United States; and from these no doubt, they derive many of their assistants in the work of the stations; but they also look to the German Universities for men who have received a higher education in technical science.

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*By the Chairman:*

Q. Will you tell us what you know about the working of the Experimental Garden at Washington, or the working of the Bureau of Agriculture there, and will you tell us as to the usefulness of these undertakings?—So far as I am acquainted with the Department at Washington, I think the work of that Department embraces the testing of plants and seeds at Washington, and the dissemination of seeds throughout the country. Within recent years its work has also embraced such important considerations as the development of the sorghum industry, the beet sugar industry, and productions of a similar nature. Investigations under the supervision of the Department of Agriculture have also been undertaken as to the diseases of cattle, and as to the ravages of insects and the best means that might be adopted for their prevention.

Q. Do you believe the present condition of the sorghum industry in the United States is due to the action of the American Government?—I think it is very largely. I think the interest manifested in it of recent years is very largely due to the encouragement of the Agricultural Department at Washington. But the industry, as at present carried on as a successful industry, is in the hands of private parties. I think there are at the present time in the west two factories which successfully manufacture sorghum sugar. One of them, I believe, is in Illinois. At present the industry is in its infancy, and it is a question how quickly it will become of national importance, because difficulties which have been encountered in properly extracting sugar from the sorghum have but just been overcome, and these have not been overcome so fully as to encourage parties in undertaking the cultivation of sorghum and the manufacture of its sugar upon a large scale.

Q. Do you know if the Government chemist at Washington has made any special studies regarding sorghum sugar and the way of extracting it from the cane?—The present chemist has made some investigations in that direction, but the investigations which were made were chiefly conducted by his predecessor, Dr. Collier, who carried on experiments, both in the field, growing different varieties of sorghum, and in the laboratory, testing them, for a number of years; and the knowledge we have concerning the methods to be employed is chiefly due to him.

Q. What do you think of the distribution of seeds from the Bureau of Agriculture in Washington?—I think that the work they have performed in past years, and what they are performing to some extent now, should more properly be left in the hands of private parties. So far as the results of their operations are concerned, I can say nothing decisive; but it seems to me, that the distribution of seeds by the Government Bureau is not desirable. The distribution of seeds should be left in the hands of private parties; but the business should be supervised and controlled by the Government, precisely as we now control in the States the fertilizer business. The seeds that have been sent out by the Department of Agriculture in Washington, in former years, have been notoriously bad. They were scattered broadcast over the country, and they did no material good. Men would receive them and lay them by on their shelves and purchase seeds from a reliable dealer. That has been the general experience throughout the country; and it seems to me that the only way to have seeds properly distributed is to encourage private dealers to sell a good quality of seeds. By a Bureau of Agriculture, or a special experiment station, if you have one, let the distribution be controlled. Insist upon it, that the seedsmen sell seeds of good quality, seeds that are not contaminated with weed seeds. Insist upon it, that there be no deterioration in the seeds, and that there be a proper percentage of vitality in them; in other words, that they be sufficiently fresh.

*By Mr. Foster:*

Q. How would you propose to do that?—By having the seeds inspected at such times as may be deemed necessary, by authorized inspectors. Let the inspector collect his samples in such a way as may be deemed best, and let those samples be tested. In the United States, at the present time, a great many of the most prominent seedsmen test their own seeds. They have their own specially employed seed tester, who devotes his time to that work. Upon those men we can rely for good seed. But there are many other seed dealers who do not have their seeds tested in that way, and who would perhaps be willing to flood the market with spurious articles, and it is these men who should be under control.

Q. You would inspect only the wholesale seed?—The wholesale seed.

*By Mr. Orton:*

Q. And I suppose your idea is that the Government should have a seed tester, and that he should furnish the seedsmen with a certificate when the test is successful?—Yes.

*By Mr. Fisher:*

Q. Some such law as that of Mr. Massue's, in regard to agricultural fertilizers might, in your opinion, be applied to seeds; of course the possession of the certificate would be a great advantage to the seedsmen?—The Germans have a somewhat similar system now, which has been in force for a number of years, and their seed testing apparatus is being introduced into the United States for the same purpose, although there is as yet no Government control of the business.

Q. Might not the retail dealers sell deteriorated seed notwithstanding the test, unless we had some law to check them?—Not if the wholesale dealers put their seed up in packages. If the seed is put up in packages it should not suffer.

*By the Chairman:*

Q. Do the American farmers seem to be satisfied with the working of the Bureau of Agriculture at Washington?—I do not think they are wholly satisfied with it, from what I can learn. One great difficulty which they complain of is that the Bureau of Agriculture at Washington is too much controlled by policical influence. A Bureau of that kind, to be of great value to the farmers at large, must be, so far as its scientific work is concerned, controlled by men of proper scientific qualifications, who will be entirely removed from political influence. Then it will exert a beneficial influence, but not otherwise.

Q. Do you think the farmers would be in favor of doing away with the Bureau?—I do not think they would complain very much, although the work which has been done during the last few years in the direction of preventing the spread of diseases of cattle has encouraged the farmers to entertain hopes that in the future it might render much more valuable services to them.

*By Mr. Foster:*

Q. The system is largely unpopular, if it is unpopular through defects in its management?—That is where the difficulty lies.

*By the Chairman:*

You think it would be useful if properly managed?—I think such a Bureau is of great value. It is an important Bureau to have, but I think it must be properly managed.

*By Mr. Orton:*

Q. Is it possible to remove the Bureau of Agriculture from political influence altogether?—I think the scientific work might be removed. Yes; I think it would be perfectly possible to select for such a Department as that at Washington, a man of sufficiently broad scientific attainments to take charge of the system as a whole. Put him into the office and let him feel that his position is not dependent upon the movements of politics. I think that might be done. Then there might be, in addition to that, a Minister of Agricultural, but he need not have the immediate control of the scientific work.

Q. Would you then have the head of that Bureau appointed outside of the Government by agricultural associations? Do you propose some other mode of appointment than by the Government direct?—I think he should be appointed by the Government.

Q. But you can easily see that if he is appointed by the Government there may be possibly a suspicion that he may be influenced more or less by politics, as it will be a political appointment; whereas, if he is appointed by the agricultural societies throughout the country, it would then not be a political appointment; the Government would simply take the opinions of the agricultural societies?—That would be advisable, provided the Government did not allow the societies to give too great weight to what they call a practical agricultursit. The great trouble has been, wherever a question of that kind has been left in the hands of agricultural societies or the farmers, that they demand a practical agriculturist for the position.

*By the Chairman:*

Q. You believe that a Bureau of Agriculture in Washington, if well managed, will be very useful?—I believe it will be exceedingly useful if well managed.

Q. Do you not think it is indispensible?—As a Bureau, yes.

*By Mr. Orton:*

Q. What is that difficulty you mentioned about a practical agriculturist?—The difficulty, I said, in taking the recommendations of the agricultural societies is, that they are too much inclined to recommend for such prominent positions, that a man should be a practical farmer, a practical agriculturist, and they overlook entirely any such qualification as scientific education. Yet, there is no industry, perhaps, which demands higher and broader qualifications at the present time than that of agriculture; and it is being more fully recognized than ever that a man, to be a successful agriculturist, must have a broad grasp of scientific subjects. If a man is to lead in developing industry as a science, and he is to take charge of the scientific work of this station, he must possess very high qualifications as a scientist and not as a practical agriculturist. A practical agriculturist, as we understand it at the present day, has no special scientific qualifications. We cannot expect to put a man of that kind into an experimental agricultural station, and to bring him up to the necessary qualification; but if we have an able scientific man, a man of proper scientific ability, he can adapt himself to the wants of the farmers, and the necessities of practical agriculture will come within his grasp. It seems to me that in the appointment of such a man it would be advisable for the Government to seek the advice of the agricultural societies; yet the Government should be careful that they do not exercise too great a control in sacrificing scientific attainments to practical attainments.

*By Mr. Orton:*

Q. In fact, the business of the Bureau would be to provide scientific knowledge for the agricultural people at large?—Yes.

Q. And to give the people the benefit of science, in the way of testing seeds and other matters that are purely scientific?—Yes. It must be remembered that all the practical part of agriculture is based upon scientific facts—scientific knowledge. The first requisite is to obtain exact facts, and then these may be elaborated and adapted to the wants of the practical farmer. But you cannot, in an institution of this kind, carry on practical experimentation which is not based upon scientific accuracy, because the results will be of no permanent value; whereas, if it is done upon a basis of scientific accuracy it will be of permanent value, as well as of immediate value. The reason why the German institutions are so successful is because they have been in charge of men of the highest scientific attainments and their work has been strictly scientific in its character. It has been adapted to the work of practical farming, and the farmers appreciate it.

*By Mr. Fisher:*

Q. I think that reasoning would apply more to the gentleman who is in charge of a station, the professor or scientific man, than to the head of a Bureau. The head of the Bureau would have to be a man who would more especially understand the needs of the agricultural community, and who could view them from the broad standpoint of a statesman; whereas, the specialist who may be in charge of certain work of the Bureau, would be certainly required to be a man of scientific attainments?—If you will excuse me for saying so, I think that there is where one mistake is made. Of course I recognize that a man who is in charge of the Bureau must be a man able to understand the wants of the farming community at large. But, at the same time, he must be a man of high scientific attainments: first, because if he is, he can the more readily grasp the wants of the farmers and appreciate them, and in the second place, because if he is a man of scientific attainments those specialists under him will have respect for what he proposes. If you place in charge of a Bureau of Agriculture, as director of the scientific working of that system, a man who has no scientific qualification, and then if you place under him, in charge of one of the departments of that Bureau, a man who is far superior to him as a scientific man, it is like placing the cart before the horse. You are going backwards. The scientific men who have to do the work would have no special respect for the direction in the way of scientific work that would emanate from such a source. They must be able to look to the head of the whole system as their superior and not as their inferior.

*By Mr. Orton:*

Q. According to that you would require the head of the Department to be a specialist in every line and it would be very difficult to get a man so qualified?—Not exactly that; you cannot have a man who is really a specialist in all departments of science, at the present time; but if you get a man with sufficiently broad scientific culture, who has the requisite ability, there will be no trouble.

*By Mr. Fisher:*

Q. A man may be able to appreciate scientific necessities and yet not be himself a scientist; a man of broad, general education, need not specially be a scientist. Again, a man may have the ability to carry on the work of a scientific institution and yet not understand the needs of the community?—It is rather difficult to get a man who has not been educated in scientific work to appreciate the requirements of scientific work. I have experienced that difficulty myself. I have had, unfortunately, to come in contact with men who, though they were well educated in other respects, had not the cerebral knowledge that comes from scientific training, and they could not appreciate the difficulties in the work to be conducted.

Q. Still I think you will find in most of the universities and great colleges of the world that the Principals and Chancellors who have the management of these colleges are very frequently not scientific men in the stricter sense of the term. They are often men of literary attainments and high general culture. Still, they manage the business of higher education and employ scientific specialists to carry on the work under them?—That is true; but the two cases are not similar. In the one case education is the object in view; in the other, the acquisition of scientific facts is the object in view. I think we cannot look at them from the same point in that respect.

*By the Chairman:*

Q. Under what difficulties does the present system of agriculture labor, and in what respect is the Canadian farmer placed at a disadvantage when competing in foreign markets?—I think that question would be best answered, first, upon the ground of agricultural education. I think there is a need here, as in the United States, perhaps even more need here than there, for a higher system of education which will qualify the farmer to meet and master the problems which are inevitably bound to be presented to him in the pursuit of his avocation. A farmer at the present day, to be successful must have a certain technical knowledge, and the more he has the more successful he will be. I think that is so well demonstrated now that it will hardly need further argument. A man, to be a highly successful farmer, should receive just as much education and just as careful an education in the line of his work as the man who is to undertake a given line of manufacturing. A farmer should be educated in the direction, not only of general knowledge, but he should have accurate knowledge with reference to chemistry, botany, veterinary science and similar subjects. I think there is a problem which requires careful attention, namely, that the education of the farmer's son should be brought up to the highest level, and specially adapted to the wants of his calling.

*By Mr Orton:*

Q. How do you account for the fact that our very highly educated agriculturists are frequently failures?—Well, that is a question which I will admit, is very often asked. It is sometimes answered by saying that the application of a man's mind to literary or scientific pursuits leads him off in a direction which disqualifies him for practical pursuits; and I think that may be in a large measure true. At the same time, there are, in my mind, some of the most conspicuous examples of men of the very highest education who are among our most successful agriculturists. I have in my mind, for instance, at the present moment, a gentleman in Massachusetts, who only about ten years ago graduated at Harvard College. He graduated in good standing, and announced it as his intention at once to undertake farming as a life work. He was laughed at by his friends and told that he would make a failure. They urged him, among other things, that his very education disqualified him for practical pursuits. He did not heed what they said, for he felt firmly convinced that he was right. He bought a farm, and to-day he is one of the most successful farmers in Massachusetts, in fact, one of the most successful in the North-Eastern States. His advice is sought constantly in regard to the quality and the merits of Jersey cattle. In fact, he is the authority of the States on those cattle. The gentleman I refer to is Mr. Burnett, of South Massachusetts. I think his case is a very good evidence that education does not hurt the farmer. I do not think that brains are to be considered at a discount in farming, any more than in any other pursuit of life.

Q. At the same time, too much attention to science disqualifies a man from going into the hard work of farming?—I will admit that the more highly educated a man is the less inclination he has for drudgery. I quite agree, too, that that is a proper view to take. I do not believe in a man subordinating his brains to his hands. I believe hands should follow brains. And if a man can make more money by brain work, and by controlling the labor of others, which can easily be purchased, where brains cannot be purchased, I believe in him using his brains.

*By Mr. Fisher:*

Q. One of the great difficulties in this country is that the labor cannot be purchased; it is very difficult to purchase labor in this country?—Is it easier to purchase brains here?

*By the Chairman:*

Q. What deficiencies have come under your notice in the cultivation of fruit?—The principal difficulty there, is the want of knowledge of the proper methods of combatting diseases. I may mention, incidentally, that we have insufficient knowledge in regard to the varieties of fruit which may be adapted to given climates; but principally the deficiencies are to be found in the knowledge of the diseases attacking fruit. While there are many insect depredators, yet the injuries which I principally refer to now would be those arising from the action of vegetable parasites, or other diseases introduced by deficiencies in food. This question has of recent years demanded very prominent attention, and it has received very careful consideration. In the States of Pennsylvania, Delaware and New Jersey, the peach crop has suffered very severely within the last few years from a disease known as yellows. It is a disease which has now extended into almost every section where the peach is known in the United States. It appears in new land as well as in old land; and some special consideration has been given to determining the cause of the difficulty and the possibilities of correcting it. At the present time I may say our knowledge has reached this degree, that we have probably discovered the source of the disease to be in a special deficiency in nutrition—that is, a special deficiency in the soil, which arises there through excessive cropping and failure to return to the soil the proper elements required. The basis of our belief that the proper cause has been discovered is the fact that trees have actually been restored from a condition of disease to a condition of health. I have in my mind, at the present time, trees which eight years ago were badly diseased, but which to-day by reason of the treatment to which they have been subjected, are bearing fruit which brings the best market prices, where previously the fruit was worthless. The significance of the operations of this disease is to be found in the fact that a few years ago the southern counties of New Jersey were practically the centre of the peach industry of that peach growing state. They were the counties in which the industry was chiefly developed in the State. During my examinations into the subject two years ago, I discovered that through the operation of this disease in the peach, the industry had been entirely driven out of the southern counties of New Jersey, and the peach orchards had been forced northward and were then chiefly to be found in the central and northern counties. Although the orchards were beginning to reappear to some extent in the southern counties, yet it was found that in the majority of cases the peach could be replanted. The evidence went far to show, from the statements of the farmers themselves, that the difficulty was in soil exhaustion. Now, it is safe to say, from the results obtained in this one direction, that the value of the peach tree may, by proper treatment, as developed through these investigations, be doubled, trebled, and I have no doubt quadrupled. That, I may illustrate in this way: In New Jersey the customary practice, in view of the ravages of this disease, is to root out all the peach trees at the end of the ninth year. They considered that a peach tree nine years of age was past its usefulness. The trees were rooted out and the land turned turned over to corn or something else, so that there were only six bearing years in the life of the peach tree. We have, however, good evidence in an orchard of some two or three hundred trees that has been subject to the disease, and has been treated for it that the bearing period of the tree may be doubled. I have in mind at the present time an orchard in which the trees are now eighteen years old; there the life of the trees has been prolonged by a special method of treatment. The peach tree is naturally a long-lived tree. We have evidence that it lives to the age of fifty or sixty years, and there are cases in which it has attained an age of even ninety or a hundred years; so that there is nothing to prevent us from retaining our peach orchard for a long period of time if we only care for them properly. I have no doubt that by proper care we may at least quadruple the bearing period of our peach orchards, and the same remarks will apply to our other fruits as well as to the peach. In the case of the pear—that fruit is subject to the disease known as the fire blight, of which we have no direct knowledge either as to its cause or its remedy. It is one of the most destructive diseases we have. It appears suddenly and attacks the trees which are killed in a short time. Farmers are almost dismayed at it. They are in as much fear that they will loose their pear orchards as that they will loose their peach orchards The disease is one which requires careful and immediate attention, and it can only be dealt with by men who are scientifically able to do so. Then we have the black knot in the plum. I notice, too, by the papers during the winter that there has appeared in some of the apple orchards of the various Provinces of Canada, especially that of Quebec, a blight in the apple which affects the young branch of the fruit. If that blight is allowed to continue it must result as disastrously to the apple industry as the yellows to the peach, and the blight to the pear. These are diseases which if not checked threaten the entire destruction of our fruit industry. Of course, we cannot say that all these diseases originate in the same way. Some may originate in parasitic plants, as the black knot in the plum. The black knot of the plum is probably introduced in the first place, through injury to a large extent; then the vegetable parasite takes hold wherever the vitality is reduced, and produces a warty excresence. So it is with other diseases. We find that vegetable parasites almost always accompany them, although they cannot be the first cause. The cause is the exhaustion of the soil, and a substantial deficiency there in muriate of potash, which is a corrective. In the disease we find that the vegetable parasites are abundant, but the fact that they are not the cause of the disease. is proved by the circumstance that we have them, not only on the diseased tree, but on the tree after it has been restored to a state of health. This shows that the disease is primarily independent of them. These are questions which demand consideration, and I think it is the lack of means to properly cope with these difficulties, which we should regard as one of the great deficiencies in our present system of fruit culture.

*By Mr. Orton:*

Q. Is muriate of potash a cheap article?—It costs three or four cents a pound.

Q. Would not salt answer the same purpose?—No; because you have there an entirely different base. Potash is one of the most essential of all plant foods; it is necessary to the formation of starch. Soda is not. Soda, as compared with potash. has very little value. In fact, it is regarded by physiologists that it might in most cases be left out of the plant without injury. If you apply common salt you simply get a chlorine without an essential base. The chlorine is necessary to supplement the change developed through the action of the potash. For instance, while muriate of potash may be a specific for peach yellows, it is not a specific in pear blight. Then, while the potash is of equal value as potash to both the peach and the pear, yet the muriate is not of equal value. It depends upon the particular form in which these food elements are presented to the plant, as to to their functions, physiologically. It has been found that while the muriate of potash is good for the peach, that the sulphate of potash is better for the pear. We find, for instance, in the case of the peach that it is the chlorine that brings about the distribution through the different parts of the tree of the products necessary to growth, such as the starch. It has been found, not only by recent experiments, but by experiments made a few years ago, that where clorine is withheld from the plant—though potash may be supplied in sufficient quantities to form the starch—the starch will accumulate in the tissues where it is formed: that is, in the leaves or in the branches; it will be stored up as reserve material, and will go no further, because there are no means to distrbute it. Now by introducing chlorine into the plant food of such plants as those in which an abnormal condition has been developed, that starch is distributed again and the plant makes a healthy growth, and the normal condition will be restored. In regard to the peach yellows, the special deficiency is the deficiency of chlorine. That deficiency in old lands, where the peach has long been cultivated, is the result of long cropping without a proper return to the soil. Unfortunately it has been the practice of our farmers to plant orchards upon land and to consider that that was all the attention that was requisite. They would take apples from the trees, thus cropping the land constantly, and making no return, while in the next field they would consider that their corn would not grow without a return to the land in the shape of manure. They ignore, in the one case, what they observe in the other. They consider that trees do not require to be fed, but that crops like clover and corn require constant feeding. It should be urged that orchards should be cultivated and cared for, and manured, as carefully and as completely as any other crop; otherwise, you cannot expect to get a continuation of your produce without deterioration.

*By the Chairman:*

Q. Would the importation of fruit tree scions and plants from Russia and other countries under climatic conditions similar to those of Canada, be of service to our fruit growers?—I think it would. It is by bringing in from other countries the fruits which are peculiar to them and which may be adapted to our particular wants here. that we get a greater variety of fruit. Besides, in so doing, we would get fruits which might mature at diffierent seasons and which would vary in their keeping qualities. The great difficulties where we have not a large range of varieties is that the fruits mature at the same time or that their keeping qualities are the same. If we bring in a great number of varieties, and especially fruits of different constitutional qualities, we may get a product which will keep well, in which respect they will be of great service.

Q. Would the establishment of an experimental farm or garden where varieties of foreign grain, fruits, trees and fertilizers might be tested, and whence such seeds, plants, &c., might be distributed throughout the Dominion, be advisable?—I do not think the establisment of one farm for that work would be advisable, but I think it is an important work and that it should be carried on. If properly distributed through stations where that special work was required it would be of the highest importance to the country at large.

Q Would the establishment of a Central Bureau, having for its object the collection of imformation upon all matters relating to agriculture and having a skilled staff capable of giving advice, making experiments, and noting the improvements effected in other countries that might be advantageously introduced into the Dominion, be a benefit to our agriculturists?—Yes; I think it would be of the greatest advantage. I think, perhaps, the special points which that question calls forth have been largely answered in the other questions which we have considered; so perhaps it may be sufficient to say in general that I regard it as of the highest importance to the country.

Q. Do you not think it is of the utmost importance to have an agricultural branch of the Department organized here in Ottawa?—I consider such an organization as of the utmost importance. I should also say that my experience leads me to believe that the work of the experiment stations, so far as they are established, should be centralized in a Bureau of that kind; in other words, that though the stations are put under the immediate charge and immediate control of specialists, their work should be but parts of one well-defined system. That system should be centralized in a Government Bureau, which, for the Dominion, of course, would be properly placed at Ottawa.

Q. Would the dissemination of handbooks and reports containing information on culture, stock-raising, dairying, poultry keeping, etc., have a beneficial effect?—I think, upon general principles, that the dissemination of reports is of great value. They are, of course, largely, the only way that we have of reaching the farmers at large. At the same time, it is a question how far a Bureau of Agriculture should distribute handbooks. The function of a Bureau and of experiment stations, it seems to me, should be the collection of facts, and the distribution of reports containing those facts. It might properly devolve upon a Bureau, or upon the stations, to issue annual reports and occasional bulletins, which would cover the essential facts developed by research; but the distribution of handbooks is rather a different matter. It seems to me, that the material contained in handbooks is rather an elaboration of facts obtained by scientific research, and their application to the practical wants of the farmers; and that work ought rather to be left in the hands of outside parties. While such work might be judiciously encouraged by the Government, it does not seem to me to be the work that should be immediately undertaken by them. It should be left to outside parties, who would be encouraged in it. There are always parties who will undertake it. In fact, the great trouble in some cases has been, that there have been too many handbooks issued, and that they contained only useless repetitions, but they often, in the attempt to render them too popular, carry the elaboration of scientific facts to an extent which injures their value. Handbooks are likely to do injury rather than good, unless the material in them is properly controlled. The Government Bureau or experiment station might do an important work by controlling the matter which enters into the composition of these handbooks, and exercising a proper supervision as well as encouragement in their preparation.

Q. Would the issue of monthly bulletins and abstracts containing information regarding agriculture be of sufficient advantage to warrant their publication?—I think they would; I think occasional bulletins serve a very important purpose. But the matter which enters into their composition should be very carefully regulated. Bulletins may give such information as would be of immediate value upon the matter of fertilizer analysis and soil analysis, special directions for the care of animals, or something of that kind; but they ought not to enter into the discussion of principles. The function of the bulletin is simply to disseminate, in a compact, concise form, a few essential facts for immediate use.

Q. Do you think the services of the entomologist in Washington have been useful?—They have been of the highest value. Of course, I cannot give as exact testimony upon that as an entomologist would; but speaking in general terms, the services the entomologists have rendered in enabling us to deal very exactly and correctly with the various insects which act upon our fruit trees, and grain, and other important farm crops, have been of the highest value, and entomology is one of the special lines of scientific work, as bearing upon practical agriculture, which should receive the first consideration.

Q. Have you any other suggestions which you might offer to the Committee?—I do not think of any at present.

### A GRANGER'S DEPUTATION.

A deputation consisting of Mr. W. S. George, of New Brunswick, Chairman; Mr. R. W. Starr, of Nova Scotia; Mr. William Brock and Mr. E. Lethbridge, of

Middlesex, Ontario; and Mr. L. VanCamp of Bowmanville, Ontario, members of the Dominion Grange, was introduced.

*Mr. George:*—Mr. Chairman in compliance with an invitation from your Committee, a Committee was appointed by the Dominion Grange to meet you here to-day, and to present to you replies to the series of questions submitted for our consideration. I will read the questions and the replies:

Q. Under what difficulties does the present system of agriculture labor, and in what respect is the Canadian farmer placed at a disadvantage when competing in foreign markets?—Under the present system of immigration farmers find it impossible to obtain farm labor at remunerative prices, as the immigrants landed in Canada, who are suitable as farm laborers, are principally absorbed by the cities; that incorrect impressions are conveyed to intending immigrants by agents and others, as to the labor required and the wages paid. And the same principal applies to domestic servants. Consequently the farmers of this Dominion are not in a position to compete in foreign markets.

Q. What deficiencies have come under your notice in the cultivation of cereals, cultivation of roots and grasses, raising of stock and wool growing, production of butter and cheese, culture of fruit, fertilizers in ordinary use?—Great deficiencies in the cultivation of those crops arise from the great want of farm laborers skilled in cultivation and lack of good and cheap fertilizers.

Q. Would the importation of seed from foreign countries benefit our farmers?—Yes, if imported from similar climates and carefully inspected.

Q. Would a general system of inspection and branding be likely to enhance the value of our butter and cheese in the home and foreign markets?—A just system of inspection and branding would enhance the value of our butter and cheese in foreign markets.

Q. Would the importation of fruit tree scions and plants from Russia and other countries under climatic conditions similar to those of Canada, be of service to our fruit growers?—Yes.

Q. Would the appointment of a public analyst, to whom samples of soil and of home manufactured and imported fertilizers might be submitted, prove of advantage to our farmers?—Yes.

Q. Would the establishment of an experimental farm or garden, where varieties of foreign grain, fruits, trees and fertilizers might be tested, and whence such seeds, plants, &c., might be distributed throughout the Dominion, be advisable?—The establishment of an experimental farm in each Province of the Dominion would be a great advantage to the farmers.

Q. Have you noticed any appreciable deficiency in the crops of your district, owing to the depredations of birds and insects?—Crops have suffered from insects.

Q. What crops and fruit products have suffered most, and from what classes of insects or birds?—Wheat and clover, from wheat midge and Hessian fly; peas, from pea bug; potatoes, from Colorado beetle; apples, from coddling moth, caterpillar, canker-worm and, in some cases, the borer; plums, by the curculio; currants and gooseberries, by the currina worm, and cherries, by the robins and cherry birds.

Q. Have any, and what, steps been taken in your district to keep down insects and birds injurious to vegetation?—Paris green has been used for potato bug and canker worm, white hellebore for currants and gooseberries.

Q. Can you furnish the Committee any details as to the amount of loss sustained by agriculturists in your locality from bird or insect pests infesting grain, clover, onions, turnips, potatoes, pease, beans, cabbages, tomatoes, squashes, apples, pears, plums, grapes, strawberries, currants, &c.?—Loss is considerably large, but can make no definite estimate.

Q. Have the timber trees in your district suffered from any of these destructive agents?—In the County of Pictou, N. S., in the years 1881, 1882 and 1883, the hardwood trees were stripped of all foliage and died; also, in the County of Kent, Ont., the maples were injured to a large extent.

Q. Would the appointment of an entomologist, whose duty it would be to give information concerning birds and insects injurious and beneficial, and the means of protecting the crops against their ravages, accomplish any benefit to the farming classes?—Yes.

Q. Would it be desirable to extend the duties of the present system of veterinary inspection of stock in quarantine and, if needful, the staff also, with the view to deal with the local development of infectious diseases among farm stock and poultry throughout the Dominion, and the best means of stamping them out?—The present system of quarantine is satisfactory.

Q. Have any steps been taken to maintain the supply of standing timber, or to replant, where it has failed?—Only for ornamental purposes.

Q. Would the establishment of a Central Bureau, having for its object the collection of information upon all matters relating to agriculture, and having a skilled staff capable of giving advice, making experiments, and noting the improvements effected in other countries, that might be advantageously introduced into the Dominion, be a benefit to our agriculturists?—It would be a great advantage to agriculturists.

Q. Would the dissemination of handbooks and reports containing the data thus collected, on culture, stock-raising, dairying, poultry-keeping, &c., have a beneficial effect?—Yes; it would be a great advantage.

Q. Would you recommend, in this connection, the formation of a section devoted to agricultural statistics, showing the acreage under the different crops, the movements and prices of grain, cattle, &c., rates of transportation, fluctuation of foreign markets, &c.; and what advantages might be expected to accrue therefrom to the producer?—Yes; it would place the producer in a position to know the market rates.

Q. Would the issue of monthly bulletins and abstracts containing such information be of sufficient advantage to warrant their publication?—Yes.

WM. F. GEORGE,
WILLIAM BROCK,
GEORGE LETHBRIDGE,
LEVI VANCAMP,
*Committee on Agriculture from Dominion Grange.*

I also hold in my hand a copy of the resolution passed last evening, as follows:—

"Moved by R. J. Doyle, seconded by W. F. George—*Resolved,* That this Grange desires to express its approval of the appointment of a Select Committee of the House of Commons, having for its object the consideration of what steps should be taken to place the Department of Agriculture in a position to better promote and encourage the agriculture of the country. Also, having received a list of questions from the Secretary of said Committee, we return those questions with our views expressed in answer. While our exports are many times larger and more important than our manufactures, the cost of legislation to develop agricultural industries is comparatively light, and quite inadequate for that purpose. Entomologists claim that the loss from insects is 10 per cent., and that it is a loss which is largely preventable. It seems to us that the Central Government ought to take action on these matters, because it can do that which, if required to be done by each Province, would cost much more, and with the possible result that some of the Provinces might neglect to take any action owing to the expense involved in proportion to the area and population. There is no lack of precedents for Government action in these matters. In view of the circumstance that this Dominion depends very largely upon agriculture for its prosperity, we deem it of the utmost importance that the Department of Agriculture should spare no reasonable expense in fostering and developing this industry; and to do so successfully it is necessary that special officers shall be appointed whose duty it is to make themselves acquainted with the requirements of agriculturists, and the best means of supplying them."

Mr. *Foster*:—Have you any remarks to make in support of this resolution?

Mr. *R. W. Starr*:—Mr. Chairman, in regard to the ravages of insects among our fruit and forest trees, there is no doubt in my mind that some legislation is necessary. It is difficult to stamp out anything of that kind by the efforts of individuals. The destruction of forests in the County of Pictou, Nova Scotia, is a matter well worthy of the attention of the Committee. I know, from my own personal knowledge, that the destruction there has been something beyond conception. The insect that has been doing the damage is the forest caterpillar. An insect of the same kind that has been for years fed on the forest trees, has, by the persistent efforts of the farmers, been kept down. When it affects the apple, there is but little difficulty in keeping it down, because everyone is interested in keeping it down, but, unfortunately, it is just as fond of the oak as the apple. Wherever there are large groves of oak, it is almost impossible to get their owners to destroy it; as a result, the caterpillar has increased wonderfully, and in some places I could mention valuable groves of oak have been destroyed. Our shipping interests and implement manufacturers are suffering in consequence. The other insect depredations are pretty persistently followed wherever men are enlightened enough to know the value of destroying them. Through the efforts of the Fruit Growers Association, whose publications are circulated widely, and by individual efforts, they are now apparently in check; but every once in a while there is a year in which they are extremely plentiful, and they get beyond us altogether. That is the case with the canker worm. They come in cycles. The codling moth which is, I understand, is bad in this part of the country, has been kept down by us by persistent cultivation of the soil and the destruction of the larvæ, which in our country seek refuge in the soil in the winter season. There is another trouble to which we are subject, which I might mention. It is the black knot which, I presume, is a fungoid growth. The only method of dealing with it is by persient stamping out, by destroying the trees attacked by it just as persistently as cattle troubled with *pleuro pneumonia*.

*Mr. Bain*:—Have you had steps taken to bring that subject before scientific men.

*Mr. Starr*:—Yes; scientific men give us their opinions and we try to profit by them as far as we can.

*Mr. Bain*:—It is not so much not knowing, as being unwilling to apply the remedy, which, in the case of the forest trees, causes the trouble.

*Mr. Starr*:—There is where we require more knowledge, and there is where scientific men are required. Where thousands of acres are subject to the destroying influences of these insects, it becomes more than individual effort, or even municipal effort, can wipe out.

*Mr. Bain*:—The trees have died from the effects of the foliage being destroyed.

*Mr. Starr*:—Yes; successive devastation of the foliage has destroyed the trees.

*Mr. Fisher*:—Has no effort been made to bring the matter before the attention of the Nova Scotia Government?

*Mr. Starr*:—I think not. It is only within a year or two that I have heard of it.

*Mr. Fisher*:—Have scientific men in Nova Scotia observed these effects and given their opinion upon them.

*Mr. Starr*:—Yes.

*Mr. Fisher*:—Do you know the area that has been injured by the depredator?

*Mr. Starr*:—A rough estimate made, I think, was 2,000 acres in the County of Pictou.

*Mr. Fisher*:—Do you think the causes and the proper remedies are known?

*Mr. Starr*:—I do not think that the necessary remedies are known.

*Mr. Fisher*:—And you think that scientific men ought to be able to find out and recommend the remedy?

*Mr. Starr*:—Yes.

*Mr. VanCamp*:—I agree with the replies made to the questions by the Committee of which I am a member: but if I may be allowed to express my experience in agriculture in the Province of Ontario, it may be of some advantage to hear. My attention has been drawn to the remark by the gentleman at the head of the table (Prof. Penhallow) advising a practical knowledge for farmers. Now, I have spent my life in the business of agriculture, and for the last thirty-seven years I have made it a point to closely observe my surroundings, in order that I may know the prosperous men. Now, gentlemen, in my immediate vicinity, within that time, we have had a great many emigrants come in from the old country, and amongst them the most prosperous men we have had in the business of agriculture have been men who have signed themselves this way: **X**. I can show you men worth $100,000 who have acquired that sum within thirty-five years, and who came in not worth a dollar. I have also paid particular attention to the men who have come in and have undertaken to practice science. Whilst this conversation was going on, the whole thirty-seven years passed before my view; and in the united counties of Northumberland and Durham, I do not know, to-day, any of those men who are in the position that they were in when they landed in our country. As for the insect scourge in agriculture, it places the agriculturist in a continual warfare, from the time the frost leaves the soil in the spring until it binds it up again in the fall. During all that time the agriculturist has no leisure. If he wishes to be prosperous he will only take sufficient time to eat his meals and sleep. At other times he will be carrying on a continual warfare with these insects. I have taken particular care to observe the man who neglects his duty on this point, and he is a failure in every respect. There is something to attack everything that the farm produces, and if we do not give our attention to it that crop is sure to be a failure.

*By Mr. George:*—I did not suppose that any of my colleagues would disagree with me, either so far as the sentiments in the replies to the questions, or those embodied in the resolution, are concerned. My friend Mr. VanCamp, however, seems to think that the man who succeeds in life is the man who only makes an *X* to his name.

*Mr. Van Camp:*—You misunderstand me. I say the most successful men in agriculture in my vicinity have been the men who have signed their names in that way. I do not class myself among those, though I have been a successful man. I can sign my name; I can write my name.

*Mr. Orton:*—What you mean to say is that agriculture requires a very great deal of watchfulness.

*Mr. Van Camp:*—Yes; and a great deal of common sense.

*Mr. Foster:*—You do not suppose it would be any disadvantage to them if they could sign their name in a better way.

*Mr. VanCamp:*—I do not suppose it would.

*Mr. Foster:*—Education would not make up for a lack of common sense; but having common sense as a starting ground, you could not injure it by education.

*Mr VanCamp:*—No.

*Mr. Fisher:*—In regard to insect life: do you not believe that a knowledge of insects would have helped your people against them?—Do you not think that men who have studied these insects all their lives, and have made a special study of them might have given you a little assistance by telling you the best way of fighting them?

*Mr. VanCamp:*—I suppose they might, if they took them in the early stages.

*Mr. Fisher:*—Do you not think it is quite likely that a man who has for ten years studied one insect might be able to instruct the farmer in regard to the manner in which to battle with it.

*Mr. VanCamp:*—Yes.

*Mr. George:*—I am glad to receive the explanation of my friend. I have no doubt that in some respects he may be correct. I have known men with little education who have been successful, but the cases are exceptional. In my experience, wherever I have found an educated man with any amount of perseverance and determination in him, that man has always succeeded. I have never known a failure. Occasionally a man without any education, but having good natural abilities and determined to succeed, will succeed. A man will succeed in any business if he applies his mind to the subject. But if we want the agricultural industry to prosper we must have educated farmers, and they must be in a position to get all the information possible. The establishment of this Agricultural Bureau, which the Government now has in view, will, I think, be one of the means of disseminating the information that is required.

*Mr. Starr*:—I think Mr. VanCamp mistakes the position. His argument is perfectly just as regards pioneers. They must have muscle, and plenty of it. But at the present day, when the country is cleared and the farmer has to come into competition with business men and with other farmers, you want brains.

*Mr. VanCamp*:—I think my Nova Scotia colleagues do not understand me. I am an advocate of education, but what I was referring to was extremes. I was thinking of the question advising scientific education; and I say now that if we had a scientific class of farmers, wholly, it would be death to our country.

*Mr. Kirk, M.P.*:—Have you found any method by which you can successfully combat the weevil in Ontario?

*Mr. VanCamp*:—I will answer that question in this way. The weevil comes to us from the east. We had heard of it from the east before it came. In fact I was warned by one of the largest grain dealers in our county that it was coming, and he said: "You will have to make a change in the management of your crops; you will have to turn to something else." We found that the only thing we could do with him was to starve him out. We had to quit raising certain kinds of wheat, and we found a kind that would answer if we sowed it late. For quite a number of years we run on this wheat—it was a Russian wheat—and we were fairly prosperous. But he changed his custom and came again; he came down to our rule and we were in difficulties again.

*Mr. Kirk*:—What wheat did you use?

*Mr. VanCamp*:—It was what we call in Ontario the old Fyfe wheat. It would bear to be sown later than any other grain we have had. For quite a time it relieved us from the weevil and the midge; but since the weevil has changed his custom and come to our rule, we have had to take our chances. Some years we would not get a crop, and other years would get a crop.

*Mr. Orton*:—In some parts of the country they abandoned the growing of wheat altogether in order to get rid of it?

*Mr. VanCamp*:—Yes.

*Mr. Orton*:—And it affected the fall wheat as badly as the spring wheat?

*Mr. VanCamp*:—Far worse.

*Mr. Jas. Fletcher*:—I have been asked to advocate the views of the entomologists. I should like to suggest to the last speaker that what he condemns, viz., a scientific education, is just what he requires. A gentleman asked for information regarding the weevil, and he made a reply about the midge. Now, the weevil is a beetle; the midge is a fly, and the remedies applicable to the one are not applicable to the other. The one great necessity among our farmers, therefore, is a certain amount of scientific knowledge. We all recognize the importance of farmers. They probably form one of the most important classes of the population; when, then, they complain that their crops are being ravaged by insects, they demand attention. But, if they do not let the people who make a special study of insect pests know what they want, and the character of the insects that are preying upon their crops, they cannot expect to get the remedy. I was not aware that the weevil, as an injurious insect, was in that part of the country yet. I shall investigate the matter. As a member of the Entomological Society of Ontario, a society actively engaged in the investigation of injurious insects, I shall enquire into the matter and shall be happy to give the gentleman who has made the enquiry the results of our investigations. But what I want to draw attention to is this, that if a farmer asks for information about a certain insect, and calls it by the name of some other insect, he cannot get the proper remedy and, as a result, his crop is not saved. Therefore, some scientific information is necessary for the farmer. It is a growing necessity to the country that the Government should distribute among the farmers information in the most easily received form, that is, in a form that the farmers will take notice of it, and read it and apply it to their own case. If the Government can distribute their information in a practical form, not too scientifically expressed, it will be a most fertile source of good to the country. The Chairman of the Grange has mentioned 10 per cent. as the extent of the insect ravages. There is no doubt that it is all that; but I honestly believe that it is more like 20 per cent. We know that certain crops are wiped out *in toto*. From the answers to the questions the Committee has sent out, you will find that the clover seed crop last year was almost totally destroyed in some parts of Canada. As a member of a society which has been engaged in trying to collect information regarding these insect pests, I may say we find the greatest difficulty in getting inquiries made by the farmers. They will not send for information. A farmer will say his crop has been wiped out, and when we ask, "Did you send for information," the reply is "No." But do we find that sort of thing in ordinary life? A man's child is taken ill. He sends for the doctor at once. And what is the doctor but a specialist in one branch of study.

*Mr. Foster:*—Do you not think that one reason is that in the one case the farmer knows where the doctor lives, and in the other he does not know where the entomologist lives?

*Mr. Fletcher:*—Of course there are a very few who make a special study of entomology, and it is exactly in this way that a State entomologist would be useful. But every farmer should be an entomologist. He should know something of the science. He knows already that these insects deprived him of an enormous proportion of his produce. It has been estimated that every plant growing on this continent has six different species of insects preying upon it and destroying it; but it is probable that there are remedies which can be applied to keep all of these in check. Some of the remedies are very complicated and hard to apply. But it is the work of the entomologist to suggest the most simple remedies. There are plenty of complicated remedies. If these are resorted to, but from some cause fail, then the whole cause gets discredited, and the entomologist is unable to secure the sympathy in his work which is necessary for success. Now we must have sympathy in this work, or no one will do it. With reference to the midge-proof wheat this gentleman has referred to, I may say it is some of the old wheat that has been improved. All the different varieties of wheat have their characteristics. In one we find a fine kernel and bad chaff, in another good chaff and a bad kernel. And the best way to deal with these is to hybridize them, to bring one that has certain characteristics, and to apply those characteristics to another. This is done in wheat just as it is done in fruit. In fruits, if we take the pollen of a tree, the qualities of which are high, though it may not be thrifty, and apply it to the pistil of a tree that has a very vigorous growth but poor fruit, and possibly an immunity from certain insect pests, we get a combination of the two and, as a result, a fine, thrifty tree, with a fine fruit. This has been studied by scientific men, particularly by Mr. Saunders, of London, Ontario, who has made a special study of it. I think the reason why insects are so injurious in Canada is first of all, owing to the very small percentage of students who study entomology, and then the difficulty that those who do study experience in getting information as to where the insect depredations are going on. If they could know where a crop was being attacked by insects, they could go off at once and visit the locality, and studying the matter on the spot would be more likely to suggest the best remedy. The remedies then should be applied to the proper causes. In Ontario there is an Entomological Society which, I think has disseminated very valuable information for all horticulturists, agriculturists and fruit growers. If that society can get information from any of the farmers of the country, that they are losing their crops, they will be happy to send some one to investigate the matter and to suggest remedies. We owe to Mr. Saunders, who has been engaged for many years in that work and who has certainly done more than any other man in Canada in that direction, the discovery and application of a very good remedy for insects preying upon such crops as Paris green cannot be applied to—as, for instance, the cabbage: We know our cabbage are suffering very much from a pest imported from Europe, the white cabbage butterfly (*Pieris rapæ*). Now, I have actually seen in the papers, the application of Paris green to cabbages advised, and the statement made that it will be safe if the cabbages are washed before they are prepared for the table. That may, or may not be the case. At any rate, I do not think any large growers of table vegetables would dare to apply a poison like arsenic to his cabbages, and then expect his customers to buy them. I do not think any one would buy them. Under the most favorable circumstances, it takes some months for the Paris green, by the chemical action of the soil upon it, to lose its poisonous properties. Now, Mr. Saunders has found that what we have been using for a number of years, under the name of Persian and Dalmatian Powder, for household pests, for bugs, and so on, can be applied without danger to cabbages and garden plants. It is a powder made from the pounded flowers of different species of pyrethrum. So applicable has this been found since Mr. Saunders discovered it, that a large farm has been started in California for the cultivation of the plant, from which they have produced enormous quantities of this poison, which is known by the new name of Buhach. It has been produced simply in tons; and the firm has promised that within a short time the price of the poison will be so reduced that it can be applied by everybody over the whole of their gardens. Now, a small portion of this poison in water, thrown on to the plants by means of a pump, has been found to have the best results on those insects which attack our garden produce. It is curious that this remedy has a very subtle effect. It is not necessary for the insects to eat it. The very contact of the body with the powder or even the volatile oil from it will kill it. Now, if this room were full of flies and a small portion of the powder were burned or even puffed into the air in the room, it would paralyze them, and they would, before long, fall to the ground dead. It has been very useful with the cabbage worm, which is a very hard one to fight, and also with those very troublesome pests in greenhouses, the aphides. If I am not detaining the Committee too long, I should like to refer to the importation of parasitical insects. A large proportion of our insects are parasitic. Nearly every insect has its insect enemies; particularly there is a large proportion of the *Hymenoptero*, or those insects to which the bee and the wasp belong, which live, during one of their preparatory stages, inside the bodies of the larvæ of other insects; the egg is laid on or inserted under the skin of the insect. These parasites feed on the inside of their hosts, and they remain until they are ready to emerge, and thus destroy them. We find that the cabbage butterfly is affected by one of these parasitic species. In England, that butterfly is kept in check by these parasites, to a great extent. Out here we have also this parasite, and I believe we should not have very much trouble with the cabbage butterfly if one could propagate its parasitic enemy. The Hessian fly is not so much of a scourge now. We got it from the east. This insect has been known in Europe for 150 years, but it has never, during the whole of its history in Europe, been the serious pest that it has here. It has been found by etomologists that there are no less than three small flies which are parasites upon it. When you consider that the fly itself is so small—it is about one-third the size of a mosquito—you can well understand that the parasite must be very small. There are no less than three different species known which feed upon this species, and keep it in check in Europe. If we can get those parasites introduced here in Canada, and then propagate them and distribute them through the country, why should we not have immunity from this pest, which destroys such a large proportion of our crops? But then there is a difficulty in the way; we may introduce some which would be as bad as the pest itself. Therefore, it would have to be a study carried out by a scientific man who would give care and attention to it. It would be a work of immense labour, but such a work as a scientific man would gladly undertake. It would have to be very conscientiously performed, and very great precautions would have to be taken to guard against mistakes. These parasites could be certainly introduced. When they come here they would prey upon our insects here. It may be thought that they may change their habits when coming to a climate different to that under which they live in Europe. It has been found by investigations in Kew Gardens, in London, that plants alter their habits and nature when coming there. Notably is this the case with the chincona. But as with plants, so with insects, the work would have to be very carefully done, so that if it were necessary for the parasite to alter its habits, the change could be effected gradually. At any rate this is a surmountable obstacle. The codling moth, now, is very injurious; it and the apple shell bark louse are the two most injurious insects in Canada. There is hardly an apple to be found around Ottawa here, that is not destroyed by these insects. The codling moth certainly can be fought with a little care. Every farmer having an interest in this matter, and being an entomologist to a certain extent, would, no doubt, for his own sake, carry out certain prescribed regulations. A Central Bureau might distribute monthly statements regarding the pests expected to attack the crops, and suggest the remedy. No doubt, then the farmer would gladly and promptly adopt the remedy, and thus much damage and loss would be avoided.

The Committee adjourned.

OTTAWA, 11th March, 1884.

The Committee met, Mr. GIGAULT presiding.—G. J. O'DOHERTY, of Ottawa, called and examined.

*By the Chairman:*

Q. What experience have you had in the sorghum industry?—I may state that I only spoke to the Chairman of your Committee last evening and I have not entered thoroughly into this question; I can, therefore, only speak of what I know in a general way. Some three or four years ago I became interested in this question of sorghum growing and its manufacture into syrup and sugar, and I got up a factory here and partially completed it. I worked up a small quantity of cane.

*By Mr. Landry:*

Q. In what part of the country was that?—Right here in Ottawa. The result was very satisfactory. I got the syrup at the rate of about 120 gallons per acre, and it was very fine. Since then I have not done anything with it. I was engaged in other ways, and I had to tell farmers who asked me, that I would not be prepared to work up their cane. There was not enough of it. Unless a sufficient number would go into the business of growing, I could not afford the time to work up their cane. I may say that I have looked into the question in the United States and I find that the growing of sorghum has been very successful there. They are gradually improving, not only in manufacturing, but in their machinery, and they have it so now that they make a very fine article of syrup and a very fine sugar. Last October I went out to Rio Grande, in New Jersey, eight miles from Cape May, and I found a very large factory in operation there. They had 1,000 acres of cane growing around the mill, and they used, besides, other cane supplied by the farmers in the vicinity. They were producing twenty-five barrels of sugar and twenty-five barrels of syrup every day. The manager reported that everything was working very satisfactorily. In conversation with him, I asked him how it was he grew the cane on such poor soil as that appeared to be. "Well," he said, "the State offered me inducements to establish the factory here, and it has been very successful." Sorghum has been grown in the United States since 1850. For the greater part of that time the business was conducted by parties who knew little or nothing about the mode of treating it. The juices were much poorer than those from the maple tree. The syrup from the cane requires very different treatment to that from the maple. You can make a fair article of maple syrup by simply boiling in the ordinary kettle; but, inasmuch as the sorghum cane is crushed between rollers, and the impurities are crushed out as well as the saccharine matter, it requires very careful treatment, in order to make a good article of syrup. Hence the farmers there were not successful. They produced a very black, strong product, and it was not at all satisfactory, though they used it for home purposes. Of late years, the Department of Agriculture, at Washington, has given a great deal of attention to this matter. They have made a special study of it and they have succeeded now in producing a very fine article of syrup and sugar. The average yield of syrup per acre—which would include the sugar, because they do not in all cases crystalize it into sugar—is from 100 to 200 gallons. They have gone over that, but that would be a fair average.

*By Mr. Bain:*

Q. Does the cane vary according to the soil in which it is grown in saccharine matter?—I have not found that to a great extent; it will vary more in its crystalizing properties. Cane grown on sandy soil will crystalize more sugar than that grown on mucky soil; but in the matter of syrup I do not find much difference

Q. The cane will make as much syrup?—Yes.

Q. But its crystalizing quality is due to the soil?—Clay soil is better for manufacturing purposes than sandy soil; but all soils which are dry enough will produce it well. I now come to the quantities grown in the United States. In 1854 there were 366,670 acres of sorghum in the United State[illegible] In 1860 there were 7,000,000 of gallons manufactured. In 1870, there were 16,[illegible]0 of gallons and twenty-four hogsheads of sugar. In 1875, in the State of Ka[illegible]lone there were 23,000 acres under cultivation, and the produce was 2,542,512 gallons of syrup. I may say that in addition to the large factory at Rio Grande, there is also one at Champagne, Illinois. This factory originated in this way: A professor of chemistry in the employment of the State in Illinois, undertook to work out or elaborate the crystalization of sorghum. He succeeded so well that he took out a patent, left the employment of the State and went into the factory. That factory made in 1882, 86,000 pounds of sugar and 26,000 gallons of syrup. They have succeeded so well that they have established similar factories in different parts of the State. I have not reports from them as to what their success has been; nor have I the result of the work at Champagne last year. In Kansas there is a very large factory, also. They must work up at least 1,000 acres of cane every year.

Q. Do you know cases in which they have manufactured under climatic conditions similar to those here, because I suppose something would depend upon the climate in maturing the cane?—They have been manufacturing in Minnesota for a great many years. I know that from 1871 to 1874, when I was there, they were manufacturing. I have been in correspondence with leading manufacturers since, and they write me that they still manufacture, though occasionally they have a bad year, which happens when there is a short season. Some of the parties write me that they find they can make more per acre growing sorghum than growing any other farm product.

Q. What variety do they grow now?—The variety best suited to this country is the early amber. It is a native of Minnesota, a cross between two other varieties of the sorghum family, and is found to be earlier by two weeks than other varieties It produces a brighter syrup, a syrup that is more easily crystalized than the other syrup.

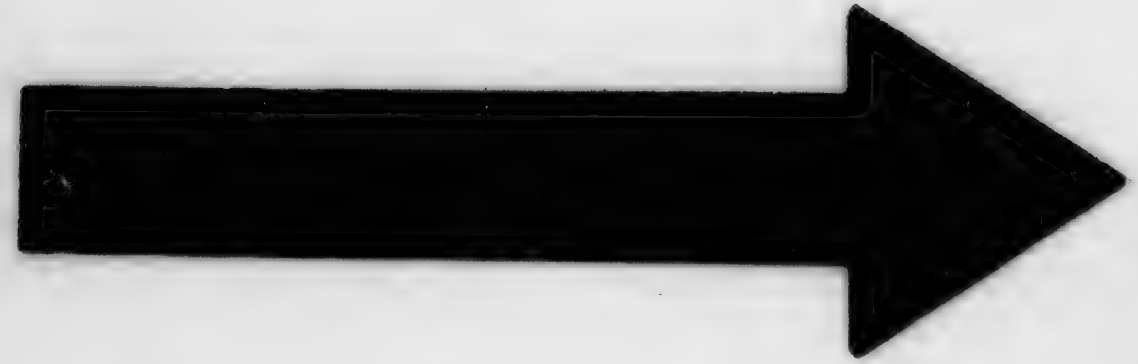
Q. About what height does it grow?—We grew it here two years ago 12 feet high, but the average may be put down at 8 feet.

Q. At what time in the season does it get sufficiently matured to enable you to commence making sugar? I suppose your experience on that point is rather limited and you cannot tell?—It was in September.

Q. You see we very seldom get past September 15th without a killing night's frost?—Some years we get caught; but I may say it will succeed wherever Indian corn will succeed. The soil required is the same; the cultivation required is the same, and the treatment in almost every way is the same, up to harvest.

Q. How do you preserve it when it gets ripe? Can you keep it for any length of time?—It will keep standing until frost comes.

Q. I suppose you would be confined, in working it, to the period between the time that it is sufficiently matured and the time the frost comes, so that the season would be comparatively short?—Comparatively short, but long enough for the farmers. It would be as long as they have for maple sugar operations They would have from two to four weeks here. In Western Ontario they would have anywhere from four to six weeks to work it in. I find that the cane matures here, and is quite



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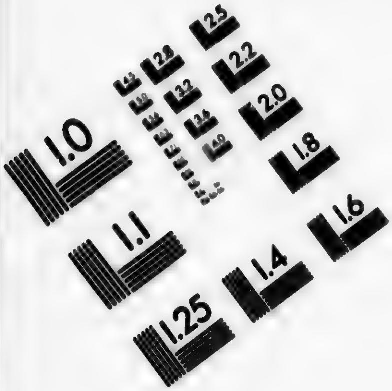

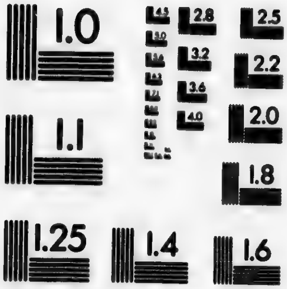

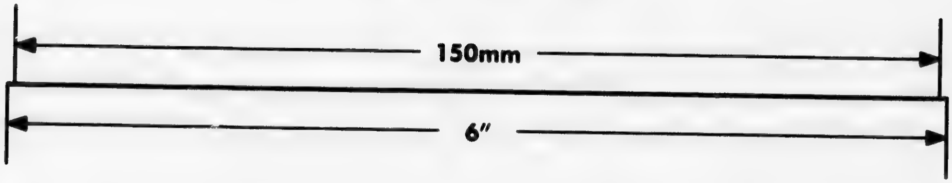

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as rich in saccharine matter as it is further south. In fact, it is quite as rich as the ribbon cane, which is the true sorghum cane of the South. The difference between this cane and the ribbon cane is that the ribbon cane is planted once every five years, whereas, the other is planted just like corn. It will ripen in from 100 to 120 days. In seed it will produce twenty or thirty bushels to the acre, and the seed is quite as good for feeding purposes as corn.

Q. Is the seed sufficiently matured to be useful?—Yes; fully matured, so that it grows afterwards, even here.

Q. And you get both the seeds and the saccharine matter?—Yes; the seed makes very fine food for hogs or chickens, for cattle or for horses.

*By Mr. Landry:*

Q. Boiled?—You can give it to them boiled or raw, just about the same as corn. In some places it is ground up and flour is made out of it. In that case it is just as well if the hulls are removed, because there is a large amount of tandem in the hulls. I may say, as to Canada, that a great deal of attention has not been devoted to it. Farmers are afraid to take hold of it; they are afraid that it will not prove successful. It is a new thing here, and they are afraid to take hold of it. They have no machinery, and they hardly know anything about it.

*By Mr. Bain:*

Q. How many acres would it be necessary to plant in order to make it worth while to buy moderate machinery? What is the smallest amount you can work it on at a profit?—You would have to give me that question more fully. A farmer may have as low as two, three, or four acres, and have plant to suit it.

Q. So, the machinery can be adapted to be used on a small quantity?—As small as you like. The most successful and profitable way to carry on this business is by the erection of central factories, just as you start your cheese factories or creameries. They are working on that plan in Demarara and some of the regular sugar States. Men are starting factories and the farmers are bringing in the cane.

Q. And you get better plant that way?—Yes; you can get better plant. You know you can spend from $150 to $100,000 in plant.

*By the Chairman:*

Q. Do you believe the sorghum cane would be destroyed by frosts very often here?—Occasionally it would, just the same as corn is. It is subject to the same climatic conditions as corn. Early frosts would take it the same year that they take corn. But there is a large portion of Canada—the southern portion—where it can be very profitably grown; in fact, more profitably than almost any other field crops.

*By Mr. Benoit:*

Q. Does the frost take away the saccharine matter?—No; but unless it is worked up immediately after it is frozen it is spoiled.

Q. I suppose it is like corn—the juice sours?—The juice sours immediately after the heat gets it; after it has been frozen it ferments.

Q. In that case it should be manufactured immediately after the cutting of the plant?—Yes.

Q. And suppose it is sent to a factory?—They are supposed to manufacture it immediately after it is brought in.

Q. Suppose it is allowed to stand for a month?—They cannot let it stand that long.

*By Mr. Bain:*

Q. I suppose there is no process by which it can be allowed to dry and get the moisture through it again?—That has been done. Instead of grinding it they have adopted the infusion process; they get a better sugar, but that has only been done in the regular sugar cane plantations.

Q. If it could be introduced it would lengthen the season of the plantation very much?—Yes; it would.

*By Mr. Benoit:*

Q. Is it not possible to store the material in a shed for some time?—No; they cannot do that on the plantations south, the heat would spoil it. That can be done in no way. It will stand very well in the field, but if you pull it, it will heat and sour.

*By Mr. Bain:*

Q. I suppose beet-root is the only thing that will store and manufacture into sugar afterwards?—About the only thing.

*By the Chairman:*

Q. What is the average yield per acre?—From 100 to 200 gallons of syrup.

*By Mr. Landry:*

Q. And of sugar?—It has been found to yield, in the Champagne factory alone, from five to seven pounds per gallon.

*By Mr. Bain:*

Q. What kind of sugar is turned out?—The sugar I saw was a nice yellow sugar. It was was well crystalized and of a hard grain.

*By Mr. Benoit:*

Q. What was the taste of the syrup?—Like the ordinary syrup.

Q. Any smell?—That is all removed by chemical process: by a process of filtration.

*By Mr. Bain:*

Q. Is the process intricate?—As with making cheese or butter it requires close attention and considerable skill. A clumsy person cannot make it properly; but any one who can make good butter or good cheese can make good syrup. I mean, anybody having the intellect to make the one can make the other.

Q. There is not any particular chemical process that you have to put it through?—There is; but it is a simple one. The cane juice is naturally acid, and you have to neutralize that acid by chemical agency. You take carbonate of lime or some other alkali and it will neutralise it. Ordinary lime or milk of lime is what is in general use for that purpose. It is used on the sugar plantations. When you get the acid neutralized there is nothing but filtering to be done afterwards.

*By Mr. Benoit:*

Q. Did you sell any of the syrup you made?—I did.

Q. At What price?—I got 70 cents a gallon.

*By the Chairman:*

Q. So you believe that sugar cane culture may be made a success in Canada?—In the southern portions of Canada it can be made a decided success.

Q. What would you suggest as a means of encouraging its growth?—I would suggest that the Government should offer inducements, as is done in the American States. In the American States they granted a bonus of $1 a ton for every ton of cane grown and brought to the factory, and a cent a pound upon the product.

*By Mr. Bain:*

Q. Does the United States Government give that, or the local authorities?—It was given by the State Governments. They gave a certain price per ton on all cane grown and brought to the factory to be manufactured, and then a certain other bonus on the product manufactured. That was done until the farmers got to understand it.

Q. Redpaths would object to that?—I do not think it would interfere with Redpaths', because they could take this sugar and refine it into white sugar, and it would be a better article than they can get in the West Indies.

Q. They buy low grades there?—It would not pay them to take low grades; it would pay better simply to make the syrup than to make a low grade. Inasmuch as that those who are now manufacturing the sorghum sugar in the United States do not use any acids to bleach or brighten it in any way, that sugar is more in demand than the refinery sugar, for bakers' purposes, and so on.

Q. It would be rich in saccharine matter?—Yes; and very free from acids. If you introduce any sulphuric acid into it, it will not do for bakers; it will destroy the fermentation of the bread.

*By Mr. Benoit:*

Q. Do they not export molasses and sugar to Europe from the United States?—No; they are importing very largely. They do not produce enough for themselves.

A short time ago the Commissioner of Agriculture there stated, that judging by the progress that had been made, the Northern States, in a few years, would produce all their own sugar.

*By the Chairman:*

Q. Do you know of any other sorghum sugar factory in Canada besides your own?—They have been manufacturing it in Western Ontario; in the Niagara, or rather west of it, towards Detroit.

*By Mr. Benoit:*

Q. Did you notice in the papers that a company had started a sorghum factory at Niagara?—No; I did not. There was one at Tilsonburg; perhaps that is the one that you refer to. They have been growing sugar for years in the County of Essex, but they have been working it up in a very crude way.

Q. Is it still in operation?—Yes.

Q. What do you do with the refuse from the cane?—I should recommend its being used for manure.

Q. Then you have to cut it?—It is pretty well cut up when it comes from the crushing mill.

Q. We were unsuccessful with the sorghum in our county. Do you remember last year, that the frost came early.—Yes; but that frost also swept over the Western States, where both corn and fruits were destroyed.

Q. For two years it has been destroyed everywhere in Canada. I do not know whether, in view of that, you can say it is a very safe enterprize?—It is as safe as corn. In fact it is hardier than corn and will stand more frost than corn.

Q. Which, in your opinion, is the best way to manufacture it: at the large factories or at home?—I would recommend central factories, the same as cheese factories. If there were central factories the farmers could bring in their cane, but those who would have too far to bring it safely as cane, could make it up into semi-syrup. In the latter way it can be sent at any time to the factory, where it can be refined either into sugar or refined syrup.

Q. How can the cane be kept without souring?—You cannot keep it.

Q. It will not stand one night, according to my experience?—Every hour makes it less valuable. But the farmer, who lives too far from the factory, should have his own little crushing mill. With th[illegible] can crush out the syrup, which he then boils to a certain stage, and sends it to the factory where it it will be finished.

*By Mr. Bain:*

Q. What would be the smallest capital to put into a factory, to make it of any advantage?—It depends upon whether you are making only syrup. If you go to make sugar it will be much more expensive.

Q. Syrup is a simpler matter?—Yes; to make sugar it will take at least $10,000.

*By Mr. Benoit:*

Q. What have they done in that regard in the Western States?—They have factories there costing from $20,000 to $100,000—those large factories I have spoken of. In Minnesota they have small factories; they turn out a little sugar, but not much. I think if our Government would follow the example of some of the American States, and give a bonus, of say, a dollar for every ton of cane grown, and a cent a pound upon the product, in a few years we would produce a very large proportion of our sweetening requisites. The Government should also make it incumbent upon the factories receiving the bonus to impart such information to the farmers as would enable them to work up their product in a skilful manner.

Q. It would be an immense advantage if the farmers could get correct information, and see the process?—Yes.

Q. Which would be the more profitable for the farmer to grow, the mangold wurtzel or the sorghum, for the production of sugar?—Beets or cane? I think they would be about the same. I do not think there would be much difference.

*By Mr. Bain:*

Q. Have you had any experience with beets?—No; but I have looked into them as to the profits.

*By Mr Benoit :*

Q What was the cost of the production of your 120 gallons of syrup ?—I could hardly tell you ; I had other things in hand at the time.

Q. Suppose a farmer cultivated an acre of sorghum, what would be the net profit ?—I could not give you the net profit to the farmer, because he does the work himself. I might give you the gross profits.

Q. What is the cost of producing an acre of sorghum ?—The way I would calculate the gross profits would be this : Suppose he takes his cane to the factory ; half of the syrup goes to the factory and half goes to the farmer. The farmer would have 60 gallons for his share ; it is worth 50 cents per Imperial gallon. That would give him $30 for his acre, besides which he would have twenty bushels of seed as grain, which would be worth 60 cents a bushel.

Q. You could not use the seed east of Montreal. It does not ripen ; some heads may, but a very few ?—Here it ripens without any trouble at all. Perhaps you have not the best kind.

Q. We had the Early Amber, from Minnesota ?—There is no trouble here. Last year it would not ripen here very well. but in 1882 it ripened perfectly. The seed, as I was saying, would be worth, say $10 ; that would be about $40 that the farmer would get as the profit on his acre. The expenses, of course, have to be taken out of that. Perhaps he would do the work himself, and perhaps he would hire.

Q. At what time do you sow your seed here ?—About the 15th of May.

*By Mr. Landry :*

Q. When extracting the syrup, the factory keeps half of it ?—The farmer gets half the syrup and all the grain.

Q. And how much do you charge by the gallon, when you are working by the gallon ?—I have never done anything in that way.

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Mr. W. HAGUE HARRINGTON, of Ottawa, called and examined.

*By the Chairman :*

Q. What experience have you had in the study of entomology ?—I have been collecting and studying insects for about ten years; and for several years have been upon the Council of the Ontario Entomological Society, and have assisted in preparing the annual reports of the Society for the Ontario Government, so that I have been forced in that way to go somewhat thoroughly into the study, and especially into the study of injurious insects.

Q. What do you know of beneficial insects ?—That is a question that requires a great deal of study. There are many classes of beneficial insects. For instance, we may take the *Neuroptera*—that is the order that embraces the dragon-flies. These are all beneficial insects; they prey upon the other insects. Then in the *Coleoptera* or beetles, there are large families that are insectiverous. These are principally the ground beetles, found usually on the ground, which may, if seen on a plant, be mistaken for destructive insects, whereas they are really preying upon the insects which are injuring the plant. A knowledge of entomology is necessary, in order to know the difference. Then in the *Hymenoptera*, which includes bees and wasps, there are a great many beneficial insects, especially parasites, which, in the larval state, feed upon the injurious insects. The wasps, which many people regard as injurious, are really beneficial, because they feed upon young caterpillars, upon spiders and other insects. They are really beneficial, though they occasionally may sting grapes or other fruit. The loss, however that they occasion is very little, compared with the good they do. In all the orders there are beneficial insects, as well as injurious ones. Among the *Hemiptera*, or bugs, though many injure plants there are also many which feed on other insects. It is hard, unless a person has a perfect knowledge of entomology, to know what insects are beneficial and what are not.

Q. Can our farmers do anything to increase the number of beneficial insects ?—They could do something if they knew the beneficial insects ; they could refrain, for instance, from killing those that are beneficial.

Q. Do you know of any beneficial insect which destroys the Hessian fly ?—There are parasites which destroy the Hessian fly and also the wheat midge. The disappearance of the wheat midge is supposed to be the result of the operations of the parasite. There are probably minute parasites on all the midges and small flies, and upon their operations, to a certain extent, depends the scarceness or abundance of the insects in certain years. They help to keep them down. The cabbage butterfly is also kept down by a small parasite.

Q. Has a midge or Hessian fly-proof wheat been discovered ?—Yes ; I think it was in 1856 or 1857 that the midge was first introduced into Canada. It was introduced into the United States from Europe about the beginning of the present century, and it was very destructive in some parts of the States in 1854. In 1856 or 1857 it did great damage in Ontario ; the damage to the wheat in one of those years was estimated at $8,000,000. But by the introduction of midge-proof wheat the damage was lessened, and of late years the midge has not been abundant. Mr. Arnold, of Paris, made experiments with midge-proof wheat obtained by hybridizing. There were certain varieties which were not touched by the midge owing to their hard covering, but these produced inferior grain. By hybridizing them with a wheat producing a good grain, he got midge-proof wheat, which, owing to the hardness of the cover, resisted the attacks of the larvæ. In the same way, to a certain extent, the Hessian fly has been dealt with, by getting a grain with a heavier stalk. The Hessian fly feeds in the joints of the stalk above the root ; if the stalk is too hard for it, it cannot injure the plant very much. But as regards the Hessian fly, sowing the wheat very late in the fall is, perhaps, the principal method of dealing with it. It attacks the fall wheat principally. The eggs are laid just above the root, in the fall, and the larvæ feed in the root and in the stem. By sowing the wheat as late as possible in the fall, it would not grow sufficiently for the fly to do much damage to it.

Q. Would the amount that would be saved repay the cost of an entomological office in Ottawa ?—Undoubtedly it would. It has done so in the United States. They have a very efficient Bureau there now. And although the Central Government maintains this Bureau at a comparatively large cost—from $20,000 to $25,000—a number of the States have their own entomologists. These States evidently find that it pays, or else they would do away with their own entomologists and avail themselves solely of the work of the Central Government. Instead of doing that, they are really increasing their entomologists. In the State of New York they had a very eminent man, from 1855 to 1872, the late Dr. Fitch, whose labours saved an immense amount of money, not only in New York, but in all the different States. They now, after being without an entomologist from 1872, have another one, a very superior man, indeed, Mr. J. A. Lintner ; so that they at least see the advantage of having entomologists. Illinois, Missouri and other States have them also. If these individual States find it advisable to have State entomologists, we should consider it advisable in Canada, seeing that the conditions are even more different as between Canada and the United States than they are as between one State and another.

Q. What do you consider to be the average annual loss suffered, on account of the ravages of insects injurious to vegetation, in Canada ?—There are certain crops that are almost wholly destroyed, I may say, at certain times. There are others which suffer from 5 to 50 per cent. If you were to average the losses at a very low estimate, they would amount to very many millions a year. If we were to estimate the total annual value of the agricultural products of Canada at $200,000,000, and then place the loss at 10 per cent., it would be $20,000,000. But I think 20 per cent. would be the very lowest to put the loss at, and 25 per cent. would be nearer the mark. If you place it at 20 per cent., $40,000,000 is the amount of the damage done by the insects. Now, during the past summer, the clover seed midge, a new insect entirely, completely destroyed the clover-seed crop of portions of Ontario.

*By Mr. Landry :*

Q. What order does that belong to ?—It is a fly. It is called the *Cecidomyia leguminicola*. It was first noticed in 1878, in western New York. It received that name from Mr. Lintner, now the State entomologist of New York. Since then it has spread very rapidly. In 1882 it was noticed as doing a great deal of damage in Western Ontario, in the vicinity of London. Last year it spread through nearly all Ontario. I think it was probably introduced in the seed.

Q. Does it destroy the white clover?—It feeds also upon the white clover, and that is one of the difficulties of exterminating it. Mr. Lintner, of New York, says it can be kept under by cutting the first crop of clover. In the State of New York they cut clover twice a year, in June for hay, and in the fall for seed. This midge, like the wheat midge, lays its eggs on the seed vessels, and the larvæ feed on the seed. By cutting the clover early, when the larvæ are young, you destroy all that brood, and then before the next crop is in flower the midge will have almost disappeared. So that, though the farmer would lose a small amount on the first crop by cutting it early, he would save, by the absence of the midge, on the seed in the fall. Then, I may say, that in the distribution of the clover seed, care should be taken. A person importing the seed should see that it does not contain the larvæ, because it will sometimes remain in the seed, or among it, during the winter.

Q. Does that insect attack the hybrid clover?—It will attack all clover. It is entirely new to science within the last few years, and, as we see, it has spread immensely, and has done very many thousands of dollars worth of damage in Ontario.

*By the Chairman:*

Q. Do you think beneficial results would follow the appointment of a Government entomologist?—Certainly. I think there can be no doubt of that, because a Government entomologist would have the time and the means to investigate all insects. He would be the first to hear of them appearing at certain points; and he would be the first to tell whether they were injurious or beneficial. By the publication of annual reports, and by the issuing of bulletins whenever any special insect attracted attention, he would do much good. For instance, there are insects that may be here in a short time. There has been found, in New York State, a small beetle which attacks the roots of the clover. This is, of course, an entirely different insect to the midge that works upon the seed. It is an imported beetle from Europe, and has only been lately noticed. It has been found to be very destructive. It so injures and weakens the roots that it is impossible to mow; the mower tears the roots out of the ground. Of course that may be greatly remedied by ploughing up the crop after the second year and rotating something with it. That insect may be found here in a short time; it has only to cross the St. Lawrence to reach us. In a case of this kind, a Government entomologist, being in communication with entomologists on the other side, would know the insect, and would be in a position to suggest the remedies to apply. Besides, if he thought there was any special neccessity for it he could issue a bulletin at once, as is done in the United States, with reference to any special insect.

Q. Do you believe that if the Government appointed an entomologist, and if a proper knowledge of entomology was diffused among the farmers, the ravages done by insects would be diminished?—Certainly. The farmers last year would have suffered much less loss through the attacks upon their clover seed had they known how to meet the insect. Why, if they had saved only one per cent. more of that crop, they would have suffered less by thousands of dollars. And one per cent. upon the entire crops of Canada, means two or three millions of dollars.

*By Mr. Landry:*

Q. What is the best remedy for that clover insect?—To cut the first crop early while the larva is young. By doing this the larva is killed in the grain and there is no second brood to attack the fall crops.

*By Mr. Fisher:*

Q. How early would it be necessary to cut it?—Soon after it is in flower. The midge lays its eggs as soon as the plant is in flower. Of course, the farmer must first look to see if the midge is laying in the plants. The midge is a very small insect but it is easily distinguished from other insects; it is smaller than the wheat midge. By examining the flower occasionally, if the midge has been there, you will see, when the larva are growing and that is the time to cut it. You must cut it while the larva are young and still in the flowers, because if they are allowed to grow, they wriggle out and fall to the ground, where they pupate and when the clover is grown again they are ready to recommence their attacks.

*By Mr. Landry:*

Q. Does that insect lay eggs only once a year?—No; there are two or three broods. The first brood I was speaking of wriggles out of the seeds and drops to the ground, and after the lapse of a week or two the fly appears again. If there is another crop in flower they lay their eggs in that; indeed, as long as any clover is to be found in flower, they will continue to lay their eggs. The fall brood remains in the ground all winter. Sometimes it remains in the seed, and that is the way, no doubt, that it has been introduced into Canada. It is a small, reddish larva, and would not be noticed. In most insects the female dies almost immediately after laying the eggs and the perfect insect is comparatively short-lived. Of course the perfect insects do no damage, further than laying the eggs. The ravages are all committed while the insect is in the larval state—that is the reason why the farmer does not notice that damage is being committed—and when the fly appears the trouble is all over. I have not noticed these insects in this vicinity, but I have no doubt that next year will find them here.

Q. The insect is coming here, in your opinion?—It has spread through Western Ontario. It was very bad last summer around Toronto, and even east of Toronto it did much damage. A Government entomologist could make experiments regarding the movements and peculiarities of these insects, and could prescribe remedies for them. There is no doubt that a great deal of good has been done already by entomologists, in finding the best materials with which to destroy insects. Dr. Riley, the Chief of the Entomological Bureau of the United States, says, that the six chief remedies are tobacco, soap, hellebore, arsenic, petroleum and pyrethrum. The last is a powder which is deadly to insects, but perfectly harmless to man. It does not affect the higher animals at all. Arsenic, in its different forms of Paris green and London purple, has come into very extensive use, and is a good remedy against a great many pests, but it cannot be used on cabbages and some other crops, such as strawberries, without danger of poisoning. It is recommended very highly, however, by Mr. Saunders of London, for the codling-moth, which destroys so many apples. By syringing the trees when they are in flower, a small speck of Paris green lodging in the calyx will destroy the young grub when it comes out; and it cannot do any harm, because what lodges in the calyx is a mere speck and does not affect the apple afterwards. Mr. Saunders is a very large fruit grower and a chemist, and he states that there is not the slightest danger in using Paris green in this manner for the codling-moth, which has done so much damage through Ontario and has decreased the value of the fruit crop so enormously. Even the destruction of that one insect would repay the cost of an entomological station.

*By Mr. Fisher:*

Q. What about the other remedies you were speaking of?—Tobacco, soap and hellebore. It has been found, in regard to tobacco, that its vapor is far more injurious to insects, and far more powerful, than any application of smoke, or solution of tobacco. This is a remedy that can be very readily applied in greenhouses. The waste from tobacco can be purchased very cheaply and all that is necessary is to steam it.

Q. I suppose an entomologist for the whole Dominion could do work that would apply to all the different Provinces perfectly well?—I think so; because he would have correspondents all over the country. He could gather information in that manner, and wherever any special ravages were reported to him, he could inspect them personally. It requires a man of great experience, of course, to take charge of an entomological station. There are such immense numbers of insects, both beneficial and injurious, that it requires a great many years of hard study to become familiar with them. Some of the most destructive insects are so small as to require microscopical examination to recognize them. It therefore requires, as I say, a great many years of hard labor before a man is fitted to take charge of an entomological station.

Q Do you believe there are many insects in this country which are not to be found in the United States, insects which are not described by the United States Entomological Bureau, and for which no remedies have been prescribed?—Undoubtedly there are many. The insects, whose life histories are known, are small in number compared with those which have yet to be investigated. Besides, there is no telling what insect may at some future time become destructive, because as the conditions of the country change, the insects also change their habits to a certain extent. In this connection I may mention that many of the insects which infest our fruit trees, fed in their native state upon our forest trees. For instance, the apple borers, before apples were cultivated here, fed upon the hawthorn and juneberry. The potato beetle is probably one of the best examples of this. It was only when the potato was introduced into the section of country where it existed that it became injurious. It then left its native plant, because it found the potato more to its taste, and very soon spread all over America. In the same way there may be insects in Canada which only require certain plants to be introduced into their neighborhood to become obnoxious. When those plants suited to them reach them, they will seize upon them and may perhaps spread all over the country. It is impossible to say, at any particular time, what insect may or may not become injurious.

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Mr. PHILLIP LANDRY, M.P. (Montmagny), called and examined.

*By the Chairman:*

Q. Is agricultural chemistry very useful in agriculture, and in what way?—There is no doubt that chemistry is very useful in agriculture, especially in giving analyses of the soil, analyses of plants, and of manures. In this way it shows the farmer what is missing from his soil, and puts him in a position to replace it. In fact, chemistry and geology, of all the different sciences, are the most useful in agriculture. By the aid of these two sciences, you can tell beforehand what may be the composition of the soil. In the soil, I may say, you have organic matters and inorganic matters; and by chemical analysis you find out, in a given soil, what its principal elements are. We know also by analysis what are the chemical elements of the different plants, and what are the elements of the different fertilizers and manures. By the aid of the sciences which tell all this, you can find what plants will succeed in a given soil, and what manure is necessary for a given soil.

Q. What do you understand by the ash elements of the soil?—The ash elements of the soil are the produce of the combustion of different plants. If you take a plant and burn it, you have in the ash that is left the mineral or inorganic elements that constitute the plant. These elements are drawn from the soil. They are mineral elements and will not burn, whereas the organic elements will consume and will form other combinations.

Q. What does the atmosphere supply to the plants during their growth?—The atmosphere supplies the plants with different gasses, but not directly. You have in the air nitrogen. This is given to the plants generally in the form of nitrates or nitric acid. The nitrogen is converted into plant food by the electrical influences in the air, chiefly after a storm. After a storm you will find a peculiar odor in the air, due to the presence of ozone. When the lightning crosses the air there is a great quantity of that ozone formed. Under its influence, a combination is made with the nitrogen of the air, and in that state it is furnished to the plants. It may, indeed, be carried down by the row to the roots of the plants, to which it is given. Then, the different plants themselves, by means of their leaves, breathe air, exhaling in the day-time oxygen. In the night-time the operation is reversed. Thus, in the night-time, we find that flowers in a bed-room or chamber are injurious, because then, instead of emitting oxygen, they emit oxide of carbon or carbon.

Q. How many pounds of ash ingredients do plants remove from the ground per acre?—That is rather difficult to say. It depends upon the character of the plant and the nature of the roots. The large roots, like turnips, remove more ingredients from the soil than the clover or the other plants which are used for forage.

Q. Do you know the quantity that beet roots remove?—I could not tell you the exact quantity.

Q. Would it not be about six hundred pounds per acre?—It ought to amount to about that figure.

Q. How do you explain the fact that land that used to grow wheat produces now only small crops of wheat?—I think one of the principal reasons is because the wheat takes from the ground the phosphoric acid and potash. These are the two principal elements that constitute wheat. They are the predominant elements in wheat. If you do not restore them to the land the crop must fail. In Quebec wheat has been grown for years and years in the same field and on the same land, and the elements thus removed have not been restored to the ground. Under these circumstances, the plant does not find the elements in sufficient quantities, and refuses to grow. In a rotation we have plants that are sympathetic or antipathetic with themselves or others. Wheat is one of those plants that become antipathetic with itself; that is to say, that after a certain number of years it cannot be grown in the same field, while other plants may be successfuly grown for years and years. Some plants will grow well after other plants, others will not.

*By Mr. Fisher:*

Q. Those that take the same elements from the soil ought not to follow one another?—No.

*By the Chairman:*

Q. Would a chemical laboratory be useful?—I think a chemical laboratory would be useful, and indeed of great advantage to farmers all over the country. We have here already geological surveys of the country which describe the aspect or the formation of the land in the various regions. I think we should have some attention paid to agriculture, with a view to the making out of the places where certain plants will grow with greater facility than others. The Dominion might be divided into regions, and a chemical analysis might be made of each. Then a general statement of the composition of the different parts might be made. In addition to that, if we had a chemical laboratory here, specimens of the soils could be sent to be analyzed here. Of course, that is a work which a farmer can do. While he may tell if there is any lime in his property, while he may make two or three simple analyses, he cannot make a quantitative analysis or say what proportion of any given element there is in his soil. If a chemical laboratory were established here, farmers could send specimens of their soil here for analysis, and then get a full knowledge of the composition of their own soil.

*By Mr. Fisher:*

Q. The difficulty in the soils is, that they vary very much; it is only in certain kinds of soil that you can get a large area of similar components?—That depends upon the geological formation of the land. In some places you meet with a large area having the same qualities throughout; in others, you may find different elements in one field. It depends upon whether the strata is horizontal or oblique.

*By the Chairman:*

Q. Is the preservation and employment of our animal manures very defective among our farmers?—Yes; very defective. Most of the manures are left outside in the open air. By reason of this, the sun dries up the gaseous matters from it, and the rain washes the soluble parts out of it. Thus the assimilable principles of the manure are completely lost. The way the manure is spread on the ground in some parts of the country is a great cause of loss, too.

Q. What have you to say about our phosphate mines?—I do not really know all the riches we have in the way of phosphates; but I think that a great deal of our phosphates could be utilized if we had the necessary apparatus to change it into superphosphates. I understand that a great deal of our phosphates are carried out of the country, changed into superphosphates and brought back again. I think if the Government would give a premium to encourage the establishment of factories to bring our phosphates to superphosphates, it would be a good thing.

*By Mr. Fisher :*

Q. In other countries they use sulphuric acid from other manufactures to make superphosphates; whereas, we cannot get the sulphuric acid cheap enough ?—Yes.

*By the Chairman :*

Q. Do you think it would pay our farmers to employ superphosphates of lime ?—I understand it is a very good article, especially in the production of turnips and wheat. In wheat, the predominant element is phosphate; and, no doubt, lands which contain little or none will benefit much by the use of it. But all these fertilizers should come in after manure. I think the farmer should produce part of all his own manure. By doing so he will save greatly; and, in addition, if he manages it well he will increase his produce by ten per cent. By the addition of what we call *terre noir*, peat muck, by properly working the manure, and by having a reservoir to gather up all the liquid for use, the farmer will profit greatly.

*By Mr. Fisher :*

Q. Do you not think the farmer can spend his money more profitably by improving his barn yard manure, than by purchasing artificial manure ?—I think so.

Q. I think $100 laid out in feed, by which he can increase his barn yard manure, would be money better employed than $100 laid out in artificial manure ?—Yes; because the artificial manures are wanted mostly every two or three years; they have a very short effect.

Q. And they are not always suitable to the soil, whereas the barn yard manure is sure to be ?—Yes.

*By the Chairman :*

Q. Have you drained any portion of your land ?—Yes.

Q. Did drainage make your lands more fertile ?—Yes.

Q. To what extent ?—I think I may say there was from 20 to 30 per cent. increase in the production. The drainage gives more heat to the soil. It removes the water which, under ordinary circumstances, in evaporating, attracts the heat and keeps it from the soil. It also destroys the obnoxious and injurious substances in the sub-soil. The rain coming down, drives these substances further down, so that the roots of the plant, instead of stopping in the sub-soil, penetrates deeper. Even in dry lands it has the result of sending the water deeper below them, and you have in store more humidity for the use of the plant. The drainage, however, must be pushed deep enough, so that the implements will not touch it when the soil is being worked.

Q. How many feet below the surface should the drains be laid ?—I think under all circumstances drains should be laid at a minimum depth of thirty inches. It depends upon the soil to a large extent; but I think the minimum ought to be not less than thirty inches.

Q. Is drainage too expensive to be adopted by many of our farmers ?—Formerly we used to make drainage of planks and stones, but now it is generally of tiles. Tile drainage at the first may appear a little dearer than the other systems, but it is the cheapest in the end.

Q. Do you know the cost of it ?—It depends entirely upon the mode of drainage, whether you have a main drain and branches, or not, and the character of the soil.

*By Mr. Fisher :*

Q. Are you aware of any place in Quebec where tiles are made ?—I think there is a place near Quebec, but I do not know.

Q. They could be easily made there, for there is plenty of clay there ?—Yes.

Q. It would only need the market to create the manufacture ?—Yes.

The Committee adjourned.

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OTTAWA, March 12th, 1884

The Committee met. Mr. A. BLUE, Toronto, called and examined.

*By Mr. Fisher :*

Q. What is your official position ?—I am Secretary of the Bureau of Industries for Ontario.

Q. How long have you been engaged in that work?—Since the latter part of 1881.

Q. Was that the first establishment of the Bureau?—Yes: I began the work of organization in 1881. The first work of the Bureau in making a report of crop statistics, live stock, &c., was in 1882.

Q. Does your Bureau of Industry include anything except statistics?—The scope of the Bureau is pretty wide. Perhaps I might read you the clauses of the Act which indicate its scope:—

"(3.) It will be the duty of the Commissioner to institute enquiries and collect useful facts relating to the agricultural, mechanical and manufacturing interests of the Province, and to adopt measures for disseminating or publishing the same in such manner and form as he finds best adapted to promote improvement within the Province, and to encourage immigration from other countries; and (amongst other things) to procure and publish early information relating to the supply of grain, breadstuffs and live stock in the other Provinces of the Dominion, in Great Britain and the United States, and other foreign countries in which the Province finds a market for its surplus products, and as to the demand therefor; and he shall submit to the Legislature, within thirty days of the opening of each Session, a detailed and succint report of his proceedings.

"(4.) The Lieutenant-Governor may appoint a Secretary of the Bureau, who shall be known as the 'Secretary of the Bureau of Industries;' and may also appoint such other officers as may be necessary for the proper conduct of the Bureau.

"(5.) It shall be the duty of the Secretary, under the instructions of the Commissioner, to conduct all correspondence of the Bureau; to send to the proper officers and bodies of whom such service is required the schedules, with instructions, approved by the Commissioner, for the collection of facts and information relating to the agricultural and other industries of the Province; to receive and tabulate the information collected and obtained; to publish the same monthly or oftener during the growing season; to prepare at the close of each year a general report to the Commissioner; to compile annually from the Departmental records of the Province, and from other available records, a tabular abstract of facts relating to land, trade, government, population and other subjects; and, generally, to perform all work within the sphere of the Bureau, as he may from time to time be directed by the Commissioner."

Those two sections indicate the general scope of the Bureau.

Q. Will you give us some idea as to how all that is worked out in the Bureau?—In the first place, as to crop reports, we have a number of correspondents in all parts of the Province—between 700 and 800 in all. There is generally one correspondent at least in every township, and in some townships there are two or three. The schedules of questions are sent out to those correspondents at different periods of the year. We generally begin with the first of May, and they are asked to report as to the condition of crops, the progress of seeding, harvesting, threshing, and marketing; the condition of live stock, and the presence of prevailing diseases—if any—among the live stock, with reports as to the nature and extent of those diseases. In addition to that, we collect statistics relating to the area of land occupied, of the land under crops, of the produce of the crops, of the number of different classes of live stock, and other information of that character.

Q. Have you any other mode of obtaining that information besides through these correspondents?—The information that I have spoken of respecting areas of crops is obtained direct from the farmers—not from correspondents.

Q. Do you send the schedules to every farmer for information?—Yes, to every farmer. The first year we adopted the plan of getting that work done by school teachers, taking the school sections as a unit. We sent the schedules to the school teachers and asked them to distribute them among the farmers in their section, with instructions to farmers to fill them up and return them to the teachers. The teachers tabulated the return for their school section and returned them to the Bureau, where the school sections were tabulated by townships and the townships by counties. That system worked very well, but a number of school teachers complained of the extra work put upon them, and the system was changed last year, and we adopted, to its full extent, the English system; that is, receiving the returns, and tabulating them in the office.

Q. They are direct returns from the farmers in answer to the schedules?—Yes; this schedule we sent out last year, and it was returnable the 15th of June. You will see from it the information we collect direct from the farmers.

### "A."

### CIRCULAR TO THE FARMERS OF ONTARIO.

BUREAU OF INDUSTRIES, TORONTO, 1st June, 1883.

The object of this circular is to procure information for the second Annual Report of the Bureau of Industries. Last year the schedules were sent to farmers through the schools; and, when filled and returned to the teachers, school section reports were made up for the Bureau. There were some objections to this system, and there is reason to believe that fuller returns can by obtained by distributing and receiving the schedules direct, as in England. The return for each farm will, by this plan, be known only to the Bureau, and it will be treated strictly as confidential information, to be published in bulk form with all other returns for the county. I need hardly add that it has nothing to do with assessment, with taxes, or with party politics. The main object of the Bureau is to benefit the farmers themselves, by collecting and publishing useful facts about farms and farm-work, crops, live stock, etc. This benefit is chiefly two-fold.

(1.) By knowing whether there is a likelihood of abundance or scarcity of crops or stock, farmers have a good guide to prices. It often happens, for instance, that some kinds of crops are excellent in one part of the country and a failure in another part. Much depends on the rainfall, on local storms and drouths, and on weather effects generally. So, too, with the supply of fat and store animals. Farmers may have large numbers on hand, or they may have none to sell. Dealers know pretty well the state of the country in these respects, for it is part of their business to keep posted, and they have correspondents to supply them promptly with information. And so informed, they may, and often do, buy up the surplus grain, fruit, roots or live stock of a neighborhood before farmers know that there is either scarcity or abundance elsewhere to have any effect on prices. The Bureau, in collecting such information from all parts of the country and publishing it in special reports and through the newspapers, enables farmers to judge for themselves as to the course of prices, instead of selling or holding on in the dark.

(2.) By comparing results in their own and other countries, farmers are better able to judge of the value of their property, and less likely to part with it too cheaply, in the hope of getting richer lands and making fortunes easier elsewhere. Large numbers of Ontario farmers have sold out and gone to the North-West and to the Western States, no doubt believing that they were going to improve their circumstances by growing better crops. But it is more than doubtful if their expectations have been realized. Last year was a good year for grain crops in the United States, wheat yielding a bushel and a-half above the average. Yet the best States in the Union are found to be far behind Ontario in the staple grains. In Ohio the average of fall wheat last year was 16·7 bushels per acre; in Michigan, 17·8; in Illinois, 16; in Indiana, 15·7; in Missouri, 14·6; and in Kansas, 19·5. In Ontario, as shown by the Report of the Bureau, the average was 26·3 bushels per acre. The figures for spring wheat, barley, oats and rye are almost equally favorable, thus showing that grain-growing in Ontario must be considerably more profitable than it is in those States.

The knowledge of such facts as these must lead Ontario farmers to set a higher value on their lands, and make them less ready to leave comfortable homes here for a life of hardship on the prairies, where every stick for fuel and every board for farm-house or stable has often to be drawn a distance of ten or fifteen miles, and sometimes a great deal farther. Neither can it fail to draw the atttention of British farmers who mean to emigrate, for the information gathered by the Bureau last year has already been extensively published throughout the British Islands. Farmers with means are likely to come to Ontario in larger numbers than ever before, and not only will farms fetch better prices, but Crown lands and lands held by speculators will be settled upon, waste lands will be brought under cultivation, and the agricultural wealth of the country will be greatly increased.

Some of the statistics of Ontario gathered by the Bureau last year will no doubt be interesting to farmers. The total area of land in farms was 19,622,429 acres, of which 10,218,631 acres were cleared. The value of farm land was $632,342,500; of buildings, $132,712,575; of implements, $37,029,815; and of live stock, $80,540,720; making the total value of farm property, $832,625,610. The area and yield of crops were as follows: fall wheat, 1,188,520 acres, 31,255,202 bushels; spring wheat, 586,817 acres, 9,685,999 bushels; barley, 848,617 acres, 24,284,407 bushels; oats, 1,375,415 acres, 51,097,997 bushels; rye, 189,031 acres, 3,549,898 bushels; peas, 557,157 acres, 10,943,353 bushels; corn, 206,924 acres, 13,420,984 bushels; buckwheat, 49,586 acres, 1,247,943 bushels; beans, 19,787 acres, 409,910 bushels; hay and clover, 1,825,890 acres, 2,090,626 tons; potatoes, 160,700 acres, 18,432,145 bushels; mangolds, carrots and turnips, 104,569 acres, 471,080,726 bushels; flax, 6,157 acres; hops, 2,051 acres; orchard and garden, 213,816 acres. Of live stock, there was 503,604 horses; 23,629 thoroughbred cattle (15,385 Durham, 1,438 Devon, 841 Herreford, 270 Aberdeen poll, 1,189 Galloway and 4,496 Ayrshire); 1,562,683 grade and native cattle; 933,143 coarse-woolled sheep over one year, and 676,362 under; 178,209 fine-woolled sheep over one year, and 127,499 under; 252,415 pigs over one year, and 597,811 under. There was also 310,058 turkeys, 533,357 geese, and 4,503,705 other fowls. The coarse-woolled sheep sheared 4,842,078 pounds of wool, and the fine-woolled 904,107 pounds. There were 471 cheese factories in the Province last year, and returns from 306 of these show that 25,562,431 pounds of cheese were made, worth $2,767,035. The extent to which underdraining is carried on is shown by the fact that one-third of the tile yards in the Province, from which returns were received, made enough tiles last year to lay more than 1,000 miles of drain-works.

In filling the schedule below it is scarcely necessary to give any explanations. The acreage of fall wheat and of orchard and garden has already been collected by the assessors, but in case any portion of the wheat crop has been ploughed up or re-sown with other grain, it will be necessary to say how much. *Be careful to give your name, county, township, and post office in the blanks for these,* and answer all the other questions to the best of your knowledge. The value of property should be its *real* value, not the assessable. As to thorougbred cattle, a word of caution may be necessary. None should be entered as such unless they are entitled to herd book registry. Where a farm is leased, the return should be made by the tenant. The rent value of leased farms should only be given by the owners or tenants of such.

Tear off this circular along the perforated line and retain it. You may find the figures useful for future reference. *Fold the schedule as it has been folded, so that your name and address may be seen at once;* enclose it in the accompanying envelope, and send it to the post office on or about the 15th of June inst. If not sealed it is postage free.

A. BLUE, *Secretary.*

SCHEDULE FOR 1883. FILL UP AND RETURN ON 15TH JUNE.

*Farmer's Name*.................................................. ......

**Be careful to fill in these blanks along the dotted lines.**

*County*.................................... .... ..........................

*Township*................................... .................................

*Post Office*.................................................. ......

1. Number of acres in farm, ..................
2. Number of acres cleared, ..................
3. Acres of fall wheat ploughed up or re-sown, ..................
4. Acres in spring wheat, ..................
5. Acres in barley, ..................
6. Acres in oats, ..................
7. Acres in rye, ..................
8. Acres in peas, ..................
9. Acres in corn, ..................
10. Acres in buckwheat, ..................
11. Acres in field beans, ..................
12. Acres in flax, ..................
13. Acres in hops, ..................
14. Acres in hay and clover, ..................
15. Acres in potatoes ..................
16. Acres in mangold wurtzels, ..................
17. Acres in carrots, ..................
18. Acres in turnips, ..................
19. Acres in vineyard, ..................
20. Horses:
    1. Number of working horses, ..................
    2. Number of breeding mares, ..................
    3. Number of colts and unbroken horses, ..................
21. Thoroughbred cattle:
    1. Durham, milch or breeding cows, .........Others.........
    2. Devon, milch or breeding cows, .........Others.........
    3. Hereford, milch or breeding cows, .........Others.........
    4. Aberdeen poll, milch or breeding cows, .........Others.........
    5. Galloway, milch or breeding cows, .........Others.........
    6. Ayrshire, milch or breeding cows, .........Others.........
22. Grades and native cattle:
    1. Number of working oxen, ..................
    2. Number of milch cows, ..................
    3. Number of store cattle over 2 years, ..................
    4. Number of young and other cattle, ..................
23. Sheep:
    1. Number of coarse woolled over 1 year, ..................
    2. Number of coarse-woolled under 1 year, ..................
    3. Number of fine-woolled over 1 year, ..................
    4. Number of fine-woolled under 1 year, ..................
24. Pigs:
    1. Number over 1 year, ..................
    2. Number under 1 year, ..................
25. Poultry:
    1. Number of turkeys, ..................
    2. Number of geese, ..................
    3. Number of other fowls, ..................
26. Wool:
    1. Number of fleeces coarse wool, ..................
    2. Weight in pounds, ..................
    3. Number of fleeces fine wool, ..................
    4. Weight in pounds, ..................
27. Bushels of old wheat on hand, ..................
28. Pounds of maple sugar made this year, ..................
29. Pounds of butter made last year, ..................
30. Rods of under-drain completed on farm, ..................
31. Value of farm property:
    1. Value of land, $..................
    2. Value of buildings, $..................
    3. Value of implements, $..................
    4. Value of live stock, $..................
32. Rent value of farms per acre, $..................
33. Wages of farm hands:
    1. Per year, with board, $..................
    2. Per year, without board, $..................
    3. Per month in working season, with board, $..................
    4. Per month in working season, without board, $..................
34. Wages of servant girls, per week. $..................

Q. And one of these was sent to every farmer so far as you could, in the Province?—Yes.

*By Mr. Massue:*

Q Were they sent through the agricultural associations or directly to the farmers?—Directly to the farmers.

*By Mr. Fisher:*

Q. What proportion of answers did you get to the number of schedules you sent out?—We got about one-third; a little over one-third, I think.

Q. Were the schedules well filled up on their return?—Very well, on the whole. We got quite a sufficient number to make a perfectly safe average. We got a return covering between 7,000,000 and 8,000,000 of acres of land, and every township in the Province was fairly represented in the return. Then, of course, we estimated for the whole Province on the data of land cleared or occupied furnished by the returns. I should say that we got from the township clerks, a return of the acreage of land in each township assessed—that is, the total acreage assessed, the acreage of land cleared and the acreage of swamp, marsh, or waste land, the acreage of fall wheat, and the acreage under orchard and garden crop. The assessors begin their work usually about the 15th of February, and they are obliged by law to make their returns to the Township clerk into later than the first of May.

*By Mr. Bain:*

Q. Then you got these returns from the clerks for that season?—Yes.

Q. They furnished them to you direct?—Yes.

*By Mr Fisher:*

Q. Are they required to do so by the municipal law of the Province?—Yes; they are required to do so by section 6 of this Act, which reads as follows:—

"(6.) The officers of all societies, institutes and associations organized under the Agricultural and Arts Act, and of all municipal councils, school boards and public institutions, and all public officers of this Province, shall promptly answer all official communications from the said Bureau; shall, from time to time, collect and tabulate facts, according to instructions to be furnished them; shall make diligent efforts to supply correct information on all questions submitted to them; and generally shall act, as far as practicable, upon the recommendation of the Commissioner; and any officer of any such society, institute, association, council, school board, or public institution, making a false return of information, or refusing or wilfully neglecting to answer any question, or to fill up, tabulate and return official schedules according to the instructions and within the prescribed times, or to furnish any information relating to the industries of the Province, when required to do either by the Commissioner or the Secretary of the Bureau, shall for every such offence incur a penalty of forty dollars, which shall be recoverable by any person suing for the same before any court of competent jurisdiction, and shall be paid to Her Majesty for the use of this Province."

That refers only to officers of bodies incorporated under the Provincial Statute, and it is only to that extent that the operations of the Act are mandatory. The information we ask from our farmers is given voluntarily on their part. Many farmers, however, I have no doubt, hesitate to give the information, fearing that it has something to do with local taxation. Of course, we anticipated that before. It has been met with in every country where similar statistics have been collected.

Q. Can you give us a short outline of the information which you obtain in this way; what ground will your statistics cover? You have, to a certain extent, answered that question already, but perhaps you could state it a little more definitely?—In the special report of the Bureau we make a digest of the information given to us by our correspondents.

*By the Chairman:*

Q. Do you make enquiries respecting the ravages of insects?—Yes; and also with respect to drainage and the prevalence of noxious weeds, and any other matter of special interest to farmers.

*By Mr. Fisher:*

Q. Can you tell us what expenditure is requisite to maintain the Bureau?—In the first year the staff was not fully organized, and the expense was a little under $8,000. Last year it was considerally more, owing to the change of system. We had to employ a much larger staff of clerks to tabulate the returns. You can understand that 50,000 returns of this nature coming in, involve a great deal of work in the tabulation. We employ a number of extra clerks, for a couple of months, to carry on that work. In addition to that, a large number of reports were printed for circulation among the people, with the object of informing them as to the character of the work we were doing, and a large number, also, were sent to the old country, to be distributed there by the immigration agents. We also collect statistics of the dairy industries of the country, especially of cheese made in the cheese factories.

Q. You also obtain information in the schedules in regard to private dairies, do you not?—No; that is not asked for there. We ask for the quantity of butter made in the preceding year.

Q. How do you disseminate through the country the knowledge which you thus obtain?—Every correspondent of the Bureau is entitled to a copy of the report. We also send copies of the reports to the Granges, officers of agricultural societies, municipal clerks, and to nearly all public officers in the Province; but in addition to that, we make out a summary of each report, giving all the leading facts that it contains, on printed slips, which are sent to every newspaper in the Province simultaneously. We give no advantage to one newspaper more than another; all are served alike.

Q. How frequently do you issue these reports?—In the first year we issued five special reports—in May, July, August, September and November. Last year we issued three—in May, August and November. The May report gave an account of the condition and the area of the land under fall wheat, the condition of live stock, the state of vegetation at the time, also the area of land assessed and cleared, and the area under orchard and garden, prepared from the returns made to us by township clerks.

Q. Are you able to get this information to the public pretty soon after it is obtained?—In the case of the schedule sent to the farmers and returnable on the 15th of June, we have a report, giving the areas of all grain crops, together with estimates of the produce, issued about the 10th or 12th of August.

Q. That is, in about two months?—Yes; but before any grain is marketed.

Q. You do not issue any monthly bulletins or slips, that are distributed generally through the country?—Not monthly, but just as often as we issue reports, our bulletins are summarized from the reports. In the November report we give the complete tables of crops and live stock, with the various estimates of produce. Our estimates of produce are based on the returns made to us by threshers and correspondents, from actual results. This is the same system as is adopted in several States of the American Union, where they have State Bureaux.

Q. Do you keep any statistics of weather and seasons?—Yes; we have statistics of sunshine, precipitation and temperature. These are furnished to us under an arrangement made with the Meteoroligical Office at Toronto. The Meteorological Office, in 1881, I think, had about 55 rain-guage stations in Ontario. I secured the establishment of a large number of other stations, so that now we have returns from 150 rain-guage stations in Ontario. The Government of Ontario also furnished the Metorological Office with eight additional sunshine registers. The Office had two in the Province previously—one at Toronto and one at Woodstock. In that way we get a complete record of the sunshine in the Province. We also have reports of the temperature from the ten stations.

Q. In what way have you noticed that the agricultural community benefits from this statistical work, or in what way do you expect it chiefly to benefit them?—I think it may benefit them in a variety of ways. It gives to the whole people—producers, dealers and consumers—a knowledge of the extent of supply and demand in the country, and in that way it serves to check the operations of speculators. There are a few leading men in the country who buy up nearly the whole produce of the country. They have their agents, their buyers, all over the country. They are constantly in receipt of information from them, as to the condition and prospect of that crop, and they are able, at the earliest possible time, to avail themselves of the information collected in this way. It is not an uncommon thing for them to buy up nearly the whole available surplus of produce, before the farmers generally have an opportunity of knowing whether or not there is an excess in the supply, or whether the tendency of prices is upwards or downwards. We collect this information, and as we have as wide a circulation, at least as the dealers have, we are able to give it to the people just as early as the dealers can procure it. To give you an instance of what may be done, I would refer to the crop reports of the United States Bureau for 1873. You may remember that in 1873, as in 1883, the fall frosts were unusually early and severe, and they destroyed to a large extent the corn crop of the country. The report of the United States Bureau of Agriculture showed that the extent of the damage done in that year was at least 125,000,000 bushels of a loss to the corn crop, and almost immediately after the appearance of that report the price of corn went up 20 cents. In that case, the farmers got the benefit of the rise, and not the speculators, and I hold that it is the farmers—the producers, the men who earn—who should receive the full advantage of high prices, and not the speculators. The consumers will not be benefitted in any way by the speculators buying low, for the speculators and the dealers will sell high if the market justifies it. Then in the year 1879 again, there was a large crop of wheat in the United States, and the leading dealers in Chicago and New York, having been posted as to the condition of wheat in Europe, and knowing that the crop was a failure there, bought up nearly the whole supply of wheat in the United States—the fall wheat—at 90 cents a bushel, and almost immediately afterwards it rose to $1.20. A similar attempt was made in 1881, but it was foiled through the efforts of State Bureaux, several of which had in the meantime been established—in Illinois, Ohio, Michigan and several other States. Through the information which those reports were able to give to the public, the farmers were induced to hold their grain, and they sold it at the highest price. The Secretary of the Ohio State Board of Agriculture, who was at the head of the Bureau of Crop Reports there, estimates that in this way the farmers of the State got an increased value on their wheat crop, amounting to not less than $10,000,000. Of course, if this information had not been communicated to the people—if it had been collected and held by the large grain dealers for their own special use—that profit would have gone into their profits. As it was, it was distributed among the farmers, and it enabled them to carry on improvements on their farms, to put up buildings, and drain their lands, and so improve their condition. I remember—I think it was in the same year, 1881—that there was a failure in the bean crop in our own country, in the County of Essex especially, where the bulk of the bean crop in Ontario is grown. The grain dealers knew this. There was also a failure in the same crop in Michigan and New York. They set to work and bought up nearly the whole of the bean crop that year before it was harvested, at prices ranging from $1.25 to $1.75 per bushel, and in less than a month beans were quoted in the Detroit market at $3 per bushel. Those dealers made a profit and the farmers lost it. We seek to give to the public the information which only grain dealers and speculators generally are able to procure for themselves, and which they do procure at a very large cost. Then there are other ways in which we hold that agricultural statistics are of value to the country generally—they encourage the keeping of farm accounts, for if farmers are to make proper returns to the Bureau, they will be obliged to keep some kind of accounts. That itself is a very important thing. Then they direct dealers where to procure supplies, of store cattle for instance, or any kind of grain or root crops; they give a basis of certainty on which to compute the country's surplus produce, and they serve to prevent panic or unnecessaay fluctuations in prices, by making known exactly what the extent of the supply is in the country. By showing the probable extent of employment in the carrying trade, shipping and railway interests are enabled to make timely provision for it. They mark the tendency to overcrop and impoverish the soil, and demonstrate the value of fertilizers and improvements and reform in tillage. In recording the resources of the country, its capabilities and progress in material wealth, they serve to attract population and capital from other lands. They enable us to compare different places at the same time, and the same place at different times. I may say that our country has suffered very considerably in its reputation in the past, through the want of such a system as this, for we have had no other means of collecting such information than the Census, taken every ten years. Now the Census of 1871 gave the returns for a very bad harvest. The average production of fall and spring wheat for the Province of Ontario in that year was about ten and a-half bushels. That fact was used to our detriment in the old world, by the immigration agents of the United States. They showed how small our average was, compared with their own, and the inference was that our country must be a very poor one for agricultural purposes, and that it was a country to be shunned rather than a country to emigrate to. Now the same thing may happen at the taking of every Census. It may be a poor harvest each time, and it is only by the collection of such statistics annually that you can really show what the capabilities of the country are. According to the statistics which we collected in 1882 and in 1883, it its clear that in its agricultural resources, our Province of Ontario compares very favorably with the best State in the American Union. It may perhaps interest the Committee if I read you a table which I have prepared of the average produce of the leading grain crops in those three years. Our estimates of the yield of grain and root crops are collected much in the same way as theirs, and so far as their reliability goes, ours is, to say the least, quite as reliable as theirs. My own opinion is that it is more reliable, more accurate. Taking fall wheat, I find that the following is the average yield per acre in Ontario, and eight of the principal fall wheat growing States of the Union, during the years 1882 and 1883 :—

| | 1882. | 1883 |
|---|---|---|
| Ontario | 26.3 | 16 6 |
| Ohio | 16.7 | 9.5 |
| Michigan | 17.8 | 12 |
| Indiana | 15.7 | 10 4 |
| Illinois | 16 | 10 |
| Missouri | 14 6 | 12 |
| Kansas | 19.5 | 17 |
| New York | 18.7 | 11 |
| Pennsylvania | 15.5 | 13.5 |

I take the figures of the American yield from the report of the Department of Agriculture at Washington. The yield of spring wheat during the same years in Ontario and those States where spring wheat is grown, is averaged as follows :—

| | 1882. | 1883. |
|---|---|---|
| Ontario | 16.5 | 16.6 |
| Iowa | 11 | 12.7 |
| Minnesota | 13.3 | 13 |
| Dakota | 16.7 | 16 |

The average returns for the barley crop for those two years, according to the statistical returns, were :—

| | 1882. | 1883. |
|---|---|---|
| Ontario | 28.6 | 24.3 |
| Ohio | 19.9 | 21 |
| Michigan | 25.2 | 21 |
| Indiana | 24 | 20.4 |
| Illinois | 22.5 | 26 |
| Missouri | 23 | 22 |
| Kansas | 25.7 | 21 |
| New York | 25 | 24 5 |
| Pennsylvania | 23.5 | 25 |
| Iowa | 21.7 | 23.6 |
| Minnesota | 23.3 | 24 |
| Dakota | 29.2 | 38 |

I find the following are the average returns of the oat crop in the years named :—

| | 1882. | 1883. |
|---|---|---|
| Ontario | 36.4 | 38.5 |
| Ohio | 28 | 34 |
| Michigan | 33.3 | 36.7 |
| Indiana | 27 | 30.5 |
| Illinois | 37.4 | 33 |
| Missouri | 34.5 | 30 |
| Kansas | 38.1 | 41 |
| New York | 34.2 | 32 |
| Pennsylvani | 27.8 | 33 |
| Iowa | 31.8 | 36 |
| Minnesota | 40 | 37 |
| Dakato | 45 | 34 |

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In the same way the average yield of the rye crop is as follows:—

| | 1882. | 1883. |
|---|---|---|
| Ontario | 18.7 | 16 |
| Ohio | 15.8 | 13.7 |
| Michigan | 17 | 12 |
| Indiana | 15.1 | 11.5 |
| Illinois | 16.6 | 15 |
| Missiouri | 15.5 | 11 |
| Kansas | 22.3 | 16 |
| New York | 16.2 | 14 |
| Pennsylvania | 15.8 | 14 |
| Iowa | 14.3 | 15 5 |
| Minnesota | 18 | 16 5 |
| Dakota | 20 | 18.7 |

These figures have been a surprise to some of our own people, and they have certainly been a surprise to the Americans, especially to those Americans who are employed in the same work as myself. They had formed an opinion as to our agricultural capabilities from the census return of 1871.

Q. Can you give any information in regard to the working of Statistical Bureaus in other countries that would show any difference in working from your own?—Well, that is a pretty large question.

Q I mean, more in the management of the Bureau, perhaps, than in its results? Perhaps then, in the first place, I may refer to the English system, upon which ours is largely based. In England the first statistics were collected in 1866. It had been a subject of discussion in Parliament for a period of thirty years. Successive bills had been introduced dealing with the subject, but one after another was defeated; however, the rinderpest broke out in that country and it was suggested by the Government that it would be necessary to take a census of the live stock of the country in order to carry out the provisions of the law enacted to deal with that disease. The law provided for compensation to farmers for animals slaughtered to prevent the spread of the disease. The farmers seeing that it was in their own interest, and having opposed the measure strongly for many years before, at once fell in with it, and they gave very full returns. In the course of the same year they were asked to give returns of the acreage of crops, and as to the areas generally. They did so, and the system has been in operation very successfully there ever since. The schedules there are sent to the farmers through the officers of the Inland Revenue Department, the mail service of the country being placed at their disposal. There are a very large number of Inland Revenue officers throughout the service in England, and they are utilized to distribute the schedules to the farmers. The returns are sent to the Board of Trade in London, where they are tabulated, and a summary of the report is prepared generally about the middle of August. The returns are collected there on the 5th of June. The same system has been in operation in Scotland, and they find that every year the number of those who refused to give information—to fill up the schedules and return them to the Government—is growing less as the prejudice against the system dies out. In Ireland they have a very complete system. There the statistics are collected by officers of the Royal Constabulary Force. Being in the employ of the Government they collect those statistics as a part of their regular duty, and they get no extra pay for doing that work. They collect, in the first place, the area of land in holdings, with the extent of each holding; the areas of the different kinds of crops, the numbers of live stock, and so on. Afterwards they obtain estimates from the farmers of the average production of grain crops, after the threshing season has commenced, and areas and produce of all crops are also embraced in their returns. In France they have a very complete system, carried on under the Department of Agriculture. Every municipality makes a return through one of its municipal officers to the Government—the returns are monthly, I think—and this information is tabulated and given to the Department. A somewhat similar system prevails in Belgium and Holland. There the facts are collected by the large landholders, who hold some municipal office usually, and they are published by the Governors of the Provinces. In Hungary there is also a very complete system, and also in Austria and Austro-Hungary. In Germany they have had a system in operation for a great many years. Prior to the consolidation of the Empire, in 1871, each State of the German Confederation had its own system, and in 1870, a convention of statists was held, at which they organized a Federal scheme in connection with the State scheme. That system was adopted by the Empire, and it still continues. Each one of the old States continues its own system of collecting reports, and it makes a return to the General Government. I think all the European States have more or less perfect systems for the collection of such statistics. In Australia they have also done very good work, especially in the Province of Victoria. In that Province the assessors of the municipalities collect the information when they go their rounds each year, and they send the returns direct to the Provincial Secretary. They leave a schedule, in the first place, with each farmer. The farmer is required to fill it up and send it, as evidence that the assessor has left it with him. The work is then tabulated by the Government officers. The system costs nothing to the Province—that is, the system of collecting statistics—because the municipalities are subsidized by the Government, and if any municipality refuses to give the information, the Government has authority to appoint an officer to proceed to collect that information and charge it to the municipality, and withold the subsidy in the meantime. In the United States the system of collecting agricultural statistics was established, I think, in 1862, and it has been in operation there ever since. They have, on an average, one correspondent in every county in the Union, and each of these correspondents has two, or three, or four men, who report to him, and from their reports he prepares a report, which is transmitted to the Department at Washington, where it is tabulated. In the past this system has been largely a system of guess-work. I do not know where they have got their statistics of the acreage of land under crops, unless it has been computed from the census returns of the produce of grain, for until the census of 1880, the area of grain crops was never collected in the United States. I think that matter is a very grave defect, for I regard a return of the area of grain crops as a very necessary factor in any system of agricultural enumeration. To show you how wide of the mark their estimates are, I will compare the returns made by the United States Bureau of Statistics for the crop of 1879 with the census returns. For corn, the report of the Department of Agriculture for 1879 gave the total production as 1,547,901,790 bushels; the census return placed the figures at 1,754,861,535, being a little more than 200,000,000 above the report of the Department. The area under crop in that year, according to the report of the Department, was, in round numbers, 53,000,000 of acres; according to the census it was 62,000,000 acres. Of wheat we find that the produce was estimated by the Department for the year 1879 at 448,000,000 bushels; according to the census it was 459,000,000 bushels. That was very close. According to the Department the area under wheat crop was 32,500,000 acres; according to the census it was 35,500,000 acres. The produce of rye for the same year, according to the Department returns was 23,639,000 bushels, from an acreage of 1,625,000 acres. According to the census the produce was 19,831,595 bushels, from an area of 1,842,303 acres. Take oats next; the produce according to the Department was 363,761,320 bushels, from an area of 12,683,500 acres. By the census the total produce is given at 407,858,999 bushels, from an area under crop of 16,144,593 acres. Then take barley. The total produce of the year 1879, according to the Department, was 40,283,000 bushels, from an area of 1,690,700 acres. According to the census the produce was 44,113,495 bushels, from an area of 1,997,717 acres. The yield of buckwheat, according to the Department, was 13,[illegible],000 bushels, from an area under crop of 639,000 acres. According to the census the produce was 11,817,327 bushels, from an area of 848,349 acres. Thus, you see there is a very wide discrepancy between the actual figures collected by the census and the figures as given by the Department. I am not wholly surprised that there was such a wide discrepancy, considering the system adopted by the Department.

Q. You think the system you have in Ontario is very much more accurate than the American system?—Yes; more accurate in this respect, that we can get the areas of crops. But in a number of the States they collect areas of crops now year by year—in Illinois, Ohio, Michigan, Kansas, Missouri, and I think in Iowa. The assessors go their rounds in the month of May. They collect the area of land under the different crops, and their reports are made either to the State Bureaus or to the Secretary of State. These are at once used in the preparation of the reports. The Department of Agriculture at Washington is now availing itself of the work done by the State Bureaus, and as far as possible, it has, for the past two year, been collecting the area of land under crops. Their statistics now are, I think, much more accurate than they were four or five years ago. It is possible that the Department was not as well managed four or five years ago as it is now; in fact, I am satisfied that it was not The old statistician was removed for political reasons, but he has since been restored to his place, and the new Commissioner, Dr. Loring, a man of very great ability, is in charge of the Department.

Q Does the Federal Bureau in Washington make use of the State Bureaus?—Yes. In 1882 the Department of Agriculture obtained a grant of $100,000 from the Government to aid them in carrying on the work more efficiently. This has been expended in utilizing the State Bureaus, and a secretary has been employed in each State to report for the same. The Federal Government subsidized the State Bureaus to that extent.

Q. Can you give us any idea how a Federal Bureau could be established in this country, and what its advantages would be?—I think a good deal could be done in the way of making a Federal Bureau of service in this country. It would simply be the carrying out, or the application of, the Federal idea to the system of collecting all those statistics regarding crops, live stock, &c. The work of collecting statistics, I am convinced, however, can be more accurately done by the Provinces than by the Federal Government. They have machinery which is wanting in the Federal Government—such as municipal and school laws, and other agencies of that sort. But it would insure an earlier publication of the results, which is a very desirable thing.

Q. Do you mean that the Federal Government would be able to publish earlier returns, or the Local Government?—I mean that by retaining the local Bureau you would obtain a much earlier publication of the results. Each Province prepares its own report, and the results may be given to the public for that Province. But under the Federal system that would have to be communicated by all the Provinces to the Federal Government, there to be tabulated, and the results would be given of the whole Dominion.

Q. You think it would be better to keep up the local Bureaus themselves, and have them to publish their own provincial statistics, and then the Federal Bureau could collect the statistics from the whole of the Provinces and tabulate them for the Dominion?—Yes; the provincial Bureaus could be utilized for that purpose.

Q. You think the publication of statistics for the whole Dominion would be a benefit to the Dominion over and above what benefit the Provinces would obtain from their own provincial Bureaux?—I have no doubt of that.

Q. Could you give us an idea of what you think such a Federal Bureau would cost, when operated in conjunction with the provincial Bureaus?—That would depend a good deal on the local organization of the several Provinces. Except in Manitoba, I do not think any Province has such a complete local organization as Ontario has. If that work could be done properly in the provincial Bureau, and the results given to the Federal Bureau, I see no reason why such a Bureau could not be carried on at a cost, at the outside of $10,000 per annum.

Q. For the Federal Bureau?—Yes. Of course it would require the services of two very good men, and they should be good men.

Q. Would not the establishment of such a Bureau as that very much decrease the cost of collecting the census returns when that work comes to be done?—I do not think it would decrease the cost of taking the census very much. It would, however, give us the information which we wait altogether too long a period of time for, now to get from the census.

Q. You think it would not have any influence upon the present cost of taking the census as it has been done heretofore?—I do not know that it would, but it would give us the information much more compactly than we usually get it. Perhaps you will let me read an extract from an authority which I think all will respect. I read from a speech made by Commissioner Loring, at an agricultural convention held in Washington in 1882. It was made following a paper read by Mr. Chamberlain, the Secretary of the Ohio State Board of Agriculture. Mr. Chamberlain, in that paper, urged the Central Department of Agriculture for the United States to utilize the work done by the State Bureaus. Commissioner Loring said:

"Now I think there can be a union between this Department and the State Bureaus for statistical purposes—a valuable, reliable and important union. So convinced have I become of this that I have already presented an estimate to Congress for ten times the sum usually asked for for this work. Usually there has been appropriated $10,000 to the statistical branch of the Department. But I trust this matter may be presented to Congress in such a strong light that there will be no hesitation in increasing this insufficient sum. In the estimate I made for the succeeding fiscal year, I have asked for $100,000."

Then he goes on to say, in reference to Mr. Chamberlain's paper:—

"It has convinced me, and I trust it has convinced every member of this convention, that the statistician of this Department can put himself in immediate communication with the statistician in each State of this Union where there is one. There is no reason why statistical information should be collected for this Department and paid for by the State of Ohio, for instance. On the contrary, there is every reason why the General Government should employ persons in Ohio to furnish facts and figures that will be of use to the whole country, and while the statistical branch of this Department, in securing all those commercial facts to which the paper has alluded, and all facts relating to foreign crops and commerce, a proper combination between the States themselves and this Department will secure all the rest of the information we so desire."

*By the Chairman:*

Q. According to your statistics, have you ascertained that any crops in Ontario have been in excess of the home consumption, and how many? Has the fruit crop been in excess of home consumption, and have the Ontario farmers had to look to any foreign market for fruit?—The Bureau has not been long enough in operation to determine that question. The fruit crop has been a failure both years. In 1882 it was a failure in the western half of the Province, the circumstance of which was partly due to the extreme cold of the spring, and partly to the blight that affected the trees during the summer. In the eastern half of the Province, although the cold last spring had its effect, the crop was a very fair one, and the farmers were enabled to realize good prices, largely, I have no doubt, through the early information which the Bureau is enabled to give of the condition of the crops in all parts of the Province. A man may know what condition the crop is in in his own immediate neighborhood, but he cannot know what it is ten or twenty miles away, not to mention the extreme end of the Province.

*By Mr. Bain:*

Q Is there any other branch of information which occurs to you, that we have not asked for?—There is a good deal to say, but what I have said relates chiefly to the collection of agricultural statistics.

The Committee adjourned.

March 14, 1884.

The Committee met, Mr. **Gigault** in the Chair. Mr. **Stewart Thayne**, Ottawa, called and examined:—

*By the Chairman:*

Q. Have you paid much attention to timber culture?—Yes; I have devoted many years to the exclusive study of the question. I had a special interest in it for years, while holding the editorship of a paper exclusively devoted to timber products.

Q. Did you attend the American Forestry Congress, on behalf of the Province of Quebec?—I had the honor of doing so; the Congress included representatives from different parts of the continent.

Q. Are you acquainted with forest management outside of Canada?—Yes; I have visited most of the great forests of Europe, have studied their management, and have devoted considerable attention to their resources, with a view to ascertaining how long the supply would be likely to last. My reason for doing so was that the lumber trade of England amounts to from $80,000,000 to $100,000,000 per annum in foreign woods; it was consequently of the utmost importance that we should know how long foreign countries would be able to supply the demand, and what danger there was of the supply running short.

Q. Have you studied forestry in its relation to agriculture? How does the former affect the latter?—It is impossible to study forestry without touching upon its relation to agriculture. Both are intimately connected with each other. The failure of the one—that is the denudation of a country of its forest trees, means, if not the destruction, at least, the greatest possible injury that can be inflicted upon the agriculture of a country. It is not necessary for me, in order to prove this, to go over what has occurred in ancient times, when some of the most fertile regions in the world were reduced to barren wastes. We can see instances of this in modern times and within the memory of living man. There is an instance in the south of France where whole districts have been depopulated. This was owing to the fact that the shepherds on the slopes of the mountains cut, not only the large wood, but all the small wood for fuel. As a consequence, the soil was thoroughly exposed to the rain, and the torrents swept the whole surface soil down into the valleys beneath. Not only was the pasture land on the slopes swept off, but such enormous amounts of soil and such immense rocks and boulders were swept down, that devastation was carried into the fertile valleys below. It is found now that the injury done in those districts can only be repaired at an immense cost.

Q. Is the preservation of our woods a matter of importance to Canadian agriculturists?—In this country it is very important that the woods should be preserved, more important, I should imagine, than in the more moderate climates, where you do not meet with the extremes of heat and cold. If you destroy the vegetable barrier which you have to the north, and which breaks the force of the Arctic winds, you expose yourselves to severe storms of cold. Then it is known that when the forests are once removed the evaporation is much more rapid than it otherwise would be, and you rush from one extreme of weather to the other. The influence of forests upon the climate of a country is to equalize the temperature. Another point worthy of consideration is the fact that where you destroy the forests of a country, you also decrease the water supply. Now, for instance, the effect of disforesting the whole of the Ottawa district would be at once to dry up all those small lakes, rivulets and streams which flow into the main river. Of course, practical agriculturists can at once understand what effect that would have upon the whole region; it would be simply to render it comparatively worthless for farming purposes.

*By Mr. Massue:*

Q. Have you any suggestion to make in the direction of planting trees?—Do you mean on a large scale?

Q. Yes?—I think that in the lumbering section planting on a large scale is still unnecessary, as the young growth in the districts which are not settled would replace the old if allowed. I would not say, in its pristine vigor, but at any rate to an extent that would answer the requirements and commercial purposes of the country. But, of course, I am strongly in favor of the view that every farmer in the country should plant for his own wants.

*By the Chairman:*

Q. Can you cite any countries in which the destruction of the forests has had a bad effect upon agriculture?—Almost all countries in Europe have suffered more or less from the destruction of forests. Even in those countries where the remaining forests are now maintained in the best state of preservation, there are certain districts that have suffered fearfully. I may mention, in this connection, Switzerland, Germany, France, Italy and Spain. In Spain it is almost impossible, at all events, it would be the work of centuries, to restore such districts to their former productiveness. The slopes of the Southern Sierras, the fertility of which was, at one time, the admiration of Europe, have been entirely denuded; and those who have purchased the land, or the land owners, will not go to the considerable expense it would involve to reafforest them. I suppose this is attributable to the fact that, at least, now-a-days, most people do not think it worth while to embark in speculations that will only profit their grandchildren or their great grandchildren. The losses sustained every year by floods alone are something enormous; and those floods may be traced to the destruction of the woods on the head waters of the rivers.

Q. So you think the destruction of forests has a great influence on agricultural productions?—Most decidedly. This is a question that may be viewed from many points, but the best proof I can give you of the inflence of the forests upon agricultural productions, would be the steps taken by all the Governments in Europe to preserve their forests, and to enlarge them. They have gone the length of depriving private owners of their rights over their own wood lands in a great many instances. They insist that timber shall not be cut down on the banks of rivers within so many miles of the river bed. They require that no woods shall be cut down on certain hills where they protect a large area of arable land from such and such winds, known to be injurious to the crops in that part of the country. Such forests are made permanent. They can be thinned, but not destroyed. In Germany for instance, wherever it is necessary to cut down any forests, the whole of the neighboring land owners must be consulted; and it is only upon obtaining their consent and upon that consent being ratified by an officer of the Government, that the land owner can cut down his own trees. One reason for this, too, is the fact that the great rivers of Europe have diminished very considerably—I have not the statistics with me—during the last fifty or sixty years. Rivers, which were once navigable for vessels drawing 3 or 4 feet of water, are now not fit to float a respectable barge. This has caused very serious alarm, and much loss, because, of course, water carriage in Europe is very important, and as here, it is much cheaper than carriage by rail, in view of which it is important that the competition which exists should not be removed. This is a consideration which has exercised a very powerful influence in the direction of securing the preservation of the forests, with both the Governments of Austria and Germany.

Q. Do you believe that the destruction of the forest would affect the climate and result in more frequent droughts?—That is inevitable. Without forests you have no surface influence to equalize the temperature. The forests of a country act as conductors; they influence the air currents that pass over them; they attract the moist currents, to what extent, in this last point, is still a matter of discussion and of very serious investigation throughout the experimental stations of Europe. Attached to all the large schools of forestry they have established meterological observatories, their instruments are placed in the middle and on the borders of the forests, and in the open lands in the neighborhood, so as to be able to form an idea of the extent of the rainfall in the different sections, and, in addition, of the moisture of the soil itself.

Q. What are the defects in our present system of forest management?—I may say that the one defect in the forest management of Canada is that there is no management at all. The Governments do not seem to exercise any control over the treatment the forests receive. They regard them simply as a matter of revenue, and with the exception of certain restrictions that are placed upon the use of fire and the cutting of very small wood, they exercise no direct control over them. The limit holders are absolute masters of the woods they lease. They are not bound either to cut in one section or in another, and provided they do not cut trees under 12 inches in diameter, they are not required to make any provision for maintaining the supply of wood. There is no provision made for a district that has been cut over, a period of rest that young trees or the soil may have time to attain a certain maturity. Another thing I might have said when you asked me about the control of Governments in foreign countries over their forests, is this: there they cannot cut more than a certain proportion of trees, even in districts where the forests are used for commercial purposes exclusively; they are not allowed to cut down more in a given district or than a certain proportion; they are not allowed to cut down entire blocks. Supposing a limit owner, finding that the timber market is good, would wish to cut down a whole district, he is not allowed to do it. The Governments decide upon the quantity of lumber to be cut every year. The Government foresters then visit the forest, and point out certain blocks or certain trees in those blocks which may be cut down. Of course it would be difficult to introduce an exactly similar system in this country, but some kind of a system should be introduced, under which the Government can exercise control over the lumber limits.

Q. Have you anything to say about the nature of the control foreign Governments exercise over the wood lands of their respective countries?—The tendency is to exercise a more rigorous control over them and to prevent any steps being taken under which the regular proportion of forest land, which should exist in every State for the advantage of agriculture, may be diminished. The wood lands of a country should not be less than 25 per cent. of the whole arable lands. That is considered a proper proportion, and when that proportion does not exist, it is maintained that the cause of agriculture suffers.

Q. Could the Government or Governments of Canada exercise a satisfactory control over the wood lands of this country, and in what manner?—In the older Provinces the question is one which would involve a great deal of debate and discussion. The Government have, by the present mode of leasing limits, lost much of their power to interfere in the matter, but they might regain it by taking up limits which are denuded of their large timber by the limit holders. They might take these back into their own hands without inflicting any serious loss upon the lessees, and they might also place limitations upon the size of trees to be cut down. There are two points at least upon which they might exercise very efficient control. But the principal point upon which they might take action would be this: they should set apart the lands which are known to be unprofitable for agriculture and retain them exclusively for forestry purposes, or to the production of timber. We have lands of that character here. Up the Ottawa, for instance, settlers have been induced to go in and settle on the pine lands. There, after one or two crops, it will take more than the original value of the land to make them produce again. After three or four crops at the outside, the thin covering of soil over the sand becomes utterly exhausted. These pine lands, and all the lands only fitted for the cultivation of pine and spruce, should be set apart exclusively for the cultivation of those trees. There are millions and millions of acres in Ontario and Quebec which could be made productive timber districts, but which will never be productive agricultural districts and will never pay for the labor, to say nothing of anything else that may be spent upon them for agricultural purposes. If those lands were set apart as timber lands they would be advantageously utilized. The Government could either take them into their own possession or lease them for a certain number of years in blocks, providing that no more than a certain number of trees should be cut down, and that when they were cut the land should remain undisturbed for five, ten or fifteen years, when it would be likely that a fresh crop of wood could be taken out advantageously. Of course there are lands in which the lumbermen possess a vested interest. It cannot be denied that they have opened up these lands and that they have spent enormous sums of money upon roads, in damming the rivers and so forth. It would not be just

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to dispossess them; indeed they have rights that cannot be overlooked. Under the circumstances, there should be granted a permanent interest on these limits, but on condition that steps should be taken to maintain in such districts a regular and perpetual supply of wood. This question involves a great deal to the agricultural population of this country. These forests, it must be mentioned, would afford employment to thousands of young men who have nothing to do on their farms, during the winter months; and I know that in many districts the money earned in the woods during the winter goes to the old homestead and helps to maintain the family and to improve the farm.

Q. What advantage would our farmers derive by devoting their attention to timber culture?—The special advantage they would derive is this: On every farm there is probably a certain portion of the land which will not pay for farming purposes, but would pay a profit if laid out in wood. As to the nature of that wood—whether it should be wood for fuel or merchantable wood, black walnut or any other hard wood of annually increasing value, should be at the owner's option. Black walnut is now bringing in England $1.25 per cubic foot, and I think in New York it is up to 75 cents or 80 cents. There is a constant demand for it; in fact, the danger is, that before long the furniture manufacturers will be driven to employ some imported woods from the West Indies or South America as a substitute for it; but irrespective of that, if the farmer cannot grow hard woods for merchantable purposes he should, at any rate, grow wood for the ordinary wants of his farm. It would be advisable for every farmer, seeing the high price of fuel and the possibility of the price—particularly for wood—increasing, to set a section of his land apart in order that he may maintain his own supply of wood for fuel. I look upon it, too, in this light: Apart from the commercial value or the profit he might make by adopting the policy I have just mentioned, the farmer would have, under it, sufficient wind-breaks for winter and sufficient shelter for his cattle in summer. It is well known that sufficient shades for cattle during the summer when out in pasture are highly necessary. I know myself that in driving through Central Indiana last summer, it was in some districts pitiful to see the poor beasts leaning against wooden fences for protection from the rays of the sun; whereas, in other districts where they have retained some of the oak groves, the cattle were lying down at their ease in the shade and in apparent comfort. I need hardly say what a benefit it is to their milk and to their flesh that cattle should graze at ease.

Q. Would you favor the introduction of foreign species of trees into this country?—Decidedly. It is well known that in course of time the soils that have previously been most productive and have yielded fruits in the most prolific manner, become exhausted and refuse to sustain what they have been in the habit of producing. This applies to crops; but it is the same with trees. There comes a time when the soil is exhausted, and will no longer yield that nutriment for the trees that it formerly did. This is a matter of every-day notoriety. It is known that in certain districts, trees when first planted, flourished and made extraordinary progress in their growth, but when replanted with the same species the new plantations perished without any apparent cause. Some have attributed the circumstance to parasites: but in many districts it is well known that the real cause is the impoverishment of the soil. For this reason, I should favor the introduction of new species into the country to supply the old ones. Sometimes exotics will flourish and thrive better than the native tree will. It does not follow that they will continue to thrive; but we have it established by actual test in Europe that certain imported trees have, for one, two or three generations, thriven remarkably well. Besides, as you have rotation of crops, so it seems only natural to have rotation of trees.

Q. What agency or agencies would you employ to promote tree culture and to introduce new species?—The introduction of new species can only be effected by Government agency, that is, if you wish the advantages to be derived from so doing to be general. Individuals may go to the trouble and labor of introducing into the country new species which may be of service and advantage; but few can afford the time and expense that is requisite to insure success. Nor is it everyone who, having acquired experience that such and such varieties will thrive, that will feel it incumbent upon him to go around the country and endeavor to persuade people to adopt the new species, whatever it may be. Besides, many, from a suspicion that merely personal considerations were influencing such men, would refuse to be guided by them. That is the reason why any such movement should come from the Government, or from people who have an establishment where experiments are being carried on for the public good, and by persons of known standing and experience. Of course, the people would be much more likely to follow recommendations from such a source than from a private individual, no matter how clever, how experienced, or how well disposed he might be to work in the public interest.

Q. Do you consider the Timber Culture Acts now in force likely to extend tree culture?—No. It is now admitted in the United States that the Planting Acts, under which a certain area of land, say 80 or 160 acres, is given for planting so many acres have proved failures. They have given rise to frauds of every description. Sometimes a certain show has been made of compliance with the Acts, but after two or three years the work of planting has been allowed to drop. In fact, the whole thing involves too great an amount of inspection on the part of the Government to be efficiently enforced. Moreover, it is absurd to say to men settling in the great plain districts, strangers in the country, going there for the purpose of making a livelihood, "You must plant so many acress of land every year." A man may know nothing about arboriculture. But suppose he does possess a slight knowlddge of it, acquired in Europe, it would be useless for him to try to plant on the great plains, because there are no nurseries from which to get his plants. Men in northern Dakota and the North-West who have sent for plants have had them a fortnight or three weeks on the road in a railway van, and when they have received them they have been in most cases decayed. Then they have to take just what men, four, five or six hundred miles away, might choose to send them. It is true, too, that advice on the subject of planting may accompany the trees, but this must necessarily be of a very general nature. What may suit the soil or the conditions in one part of the North-West, may be ill adapted to the soil or the conditions 200, nay, even fifty miles away. I think if such Acts are to be of any value, it is only where there are proper nurseries in existence, supported by the Government either directly or by subsidy. Such nurseries would supply plants, which experience has shown, will thrive in the localities where they are to be planted, and they would supply, at the same time, such information to new and inexperienced settlers as would enable them to plant with some prospect of success.

Q. Do you favor the establishment of a Central Bureau of Agriculture and why?—I think it is the only means—the most direct means at any rate—by which the interests of agriculture in this country can be secured. It is very well to say that such an enterprise should be taken up by the different Provinces. but it is necessary to remember the enormous expense, or at least the very considerable expense, which would be entailed if each Province had to keep up a staff of its own—that is a staff sufficient for all the requirements and all the purposes of agriculture. Then, again I consider the competition in the commerce in agricultural produce is so great, that it is necessary that the agriculturists in this country should be made acquainted at once with every danger likely to affect the value of their crops, and every change in trade that would be likely to affect their commercial value in their own markets. That is the ground upon which continental Governments base their interference in agricultural matters. They say that their countries cannot at the present day be still while other countries are making such extraordinary strides. Of course it is the competition of the United States which is causing all these extraordinary exertions on the part of European Governments. They say that unless they can render their soil more productive, their grain of better quality, and their cattle of improved breeds, and stocks, their own people will be beaten in the competition for trade, and the agriculture of their own country must suffer enormously. Now, the agriculture Bureau Ontario is of the highest value to that Province; but its experience may be of great or of little value to the other Provinces. What a Central Bureau could do

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would be first of all, to supply information that might be of interest to agriculturists throughout the entire Dominion, and then to collect experience from all parts of the country and put it before the whole country, so that whatever was found advantageous in one place might be tested and tried in another. All this could be done by a Central Bureau with the least possible delay; and it is necessary that it should be done with the least possible delay because the race in trade now has become so keen that no country can afford to lack knowledge possessed by another.

Q. Why should the Federal Government charge itself with timber culture, seeing that the woodlands of the country belong to the Provincial Governments?—It is true that these woodlands belong to the Provinces, but then it must be remembered they form the groundwork of the greatest industry Canada possesses. After the agricultural exports, come the exports of forest produce. They amount to, I think, just about eight times as much as the exports of all the other industries of Canada combined. Consequently, as the Federal Government has charge of all that pertains to trade and commerce, it ought, to my mind, devote considerable attention to the greatest industry the country possesses. Moreover, this question of maintaining the supply of the forest wealth of the country is one which involves, not only the employment of 100,000 people, but the whole external commerce of the country is affected by it. In Quebec alone, there is scarcely a year in which we have not 600 or 800 ocean-going vessels coming in to carry away lumber. It has been said that this is a fading industry, but if it were to fade away altogether, so would the 600 or 800 vessels that visit Montreal and Quebec, and so would the large number of vessels that frequent the ports of the Maritime Provinces. If we drive away such an amount of shipping from the country, we would soon lose our position as fourth on the list of Maritime nations. Then again, another reason why every effort should be strained to make this a permanent industry is, that you have no better means of barter with foreign countries than wood. The demand abroad for wood is on the increase, and it is likely to continue on the increase, because the population of Europe is augmenting rapidly, while the area under timber is stationary; consequently, there is never any falling off in the demand for lumber Such changes as affect the lumber market are changes which are brought about by the lumbermen themselves, that is, by over-production. For instance, the demand in England has been one of steady increase; and the consumption, taking a five years' average, has been as regular as possible. But, unfortunately, the lumber merchants, when they have one prosperous year, want to make a better one the next; the consequence is that they frequently flood the foreign market with lumber, and then comes a falling off in the demand.

Q. What benefits would you expect to accrue from the establishment of a Central Bureau, and what methods could it pursue to the interests of timber culture?—One of the first duties of such a Bureau would be to find out what methods prevail in other countries, what methods are most successful, and how they can be adapted to the wants and requirements of this country. This is information which, of course, could be furnished to all the Provinces. Besides, this Government has one of the grandest opportunities imaginable, to try on its own lands in the North-West, experiments in tree culture. There, you have a country which, whatever its other advantages may be, whatever its agricultural wealth may be, certainly lacks one great element supposed to be necessary in every other country, if the agricultural classes are to prosper—and that is wood; it is—or at least an enormous section of it is—a treeless waste. How can that country be supplied with timber sufficient to influence its very fickle climate, with its storms and blizzards? How can sufficient shelter be afforded the cattle on the large plains near the foot of the Rocky Mountains? How can sufficient fuel be supplied? The fuel question, as there is coal there, is not likely to be very serious, but the quantity of wood the settlers will require must be very large, and I know its price at the present time forms an enormous tax upon the settler going into the country. So that the Federal Government, by collecting information useful to the older Provinces, and by experimenting itself in the North-West, would have the opportunity of doing a vast amount of good. Nothing would be easier than at the present time to decide, before the organization of the new Provinces finally, that in each of them, so much land shall be set apart as woodland, that so much land in every township shall be laid out in wood, or that in certain sections over which storms pass, trees shall be planted to act as wind breaks.

Q. Are you acquainted with the organization and scope of the agricultural stations in Europe? And, might similar organizations here, produce the results you have spoken of? Yes; I have seen several of these agricultural stations. I am glad to say that during the last nine or ten years they have been increasing very rapidly in every country in Europe. At a Congress held recently in France, there were representatives present from stations in Belgium, Holland, Italy, Germany and Spain. The principal objects of these stations, which are there called agricultural laboratories, are to study the nature of the soil, to analyze soils, to examine and analyze plants, fruits, and so forth, and to find out what properties various soils possess and the character of the crops those properties enable them to produce successfully. I have here a statement made at a meeting in Germany on the subject of Forestal experiment stations; and it mentions that among the problems to be solved through the agency of these stations are the following: to determine the influence of forests upon soil and climate; to investigate the relative value of the several methods of thinning; to establish reliable tables of increase, and the method of valuing forests; to study the foes of the forest, both animal and vegetable, and to devise means of successfully combatting them; to determine the value of forest better upon the growth of trees; to test the relative value of forest implements; to devise new methods of obtaining forest products, and to find new uses for the same; in short, to furnish the means by which to increase the wealth of the owners of forests, and thus that of the entire country, and to furnish legislative bodies with the foundation necessary for a just taxation of forests and for a wise and beneficent code of forest laws. So you see that the advantages to the owner of forests, and the advantages to the States are very great. Now, in order to give you an idea of the expense of this, I may mention that the Station in Prussia received in 1882, 27,000 marks or $6,750; the Station in Bavaria, 44,000 marks or $11,000; the Station in Saxony, 14,000 marks or $3,500; and the Station in Wurtenburg, 7,000 marks or $1,750. These are like central Stations having their ramifications all over the country. So that the entire amount of money expended for the maintenance of Forestal Experiment Stations in Germany amounts to about $30,000 annually.

*By Mr. Fisher:*

Q. Do not the ramifications through the country involve additional charges?—Very slight additional charges; there is a margin of $9,000 or $10,000.

Q. That charge would be included in the $30,000?—Yes. Of course a Central Bureau, conducted in an energetic manner should cause experiments to be made all over the country, and it could do this with the help of agricultural societies or horticultural associations in the various localities in which they might consider it desirable to test the growth of any prrticular tree. In one district a particular plant might be studied, and in another some other plant, so that the Bureau might have all over the country men well qualified to do the work, and proud to associate themselves with it, provided the ordinary expenses of making the tests were paid. Now, in Quebec there is a Forestal Association. If a moderate sum of money were offered by the Central Station to that association, it could procure information respecting the growth of various trees, and could distribute among people who are well-known to take an interest in forest growth, a supply of plants which they might try. This is the object of the association, but it fails of its object by the want of means. A moderate supply of money would set it in motion, and it is astonishing when once a start is made in these things how the work will go on. It would be well for a Central Bureau to inspire an interest in these things throughout the country, in order to see what information can be elicited in the country regarding the objects it should be its duty to investigate. In England and in France they have two great associations, in England, the Royal Agricultural Society, and in France, the Society for the Encouragement of Agriculture. They do an enormous amount of work for the country.

In England, of course, it is done entirely at their own expense, and for their own benefit, because there, most of the land is let out by the landlords to the farmers, and what is to the welfare of the farmer is to the welfare of the landlord, who has a pecuniary interest in securing the improvement of agricultural methods.

*By the Chairman :*

Q. Have you visited any Botanic Gardens in foreign countries ?—Yes, I have. These gardens are to be found in every part of Europe. But the Botanic Gardens are not used to the same extent there, as the Agricultural Stations. Their object is not so practical as that of the agricultural stations. Still, in all the large cities on the continent they have these Botanic Gardens, and they are regarded as necessary.

*By Mr. Fisher :*

Q. They are, I think, more a matter of pleasure and of art ; their attention is more directed towards exotics and experiments in ornamental growths ?—Yes ; but the Kew Gardens near London, and the Jardin des Plantes in Paris, have both done a great deal of good. They have had seeds from all parts of the world with a view to determining whether or not they can be acclimatized. But outside of that, their experience is worth very little. However, having direct relations with the chief officials of other countries interested in Botany, and having charge of Botanic Stations, they can obtain readily seeds from those countries. Sir J. Hooker, of Kew, receives specimens from all parts of the world, and he returns to them what he considers might be advantageously introduced into those different localities. I have no doubt, for instance, that an application to Kew Gardens would bring seeds to this country of any particular species. We could thus obtain species from Siberia, or from climates similar to our own.

*By the Chairman :*

Q. Do you think Experiment Stations might be established in this country with success ?—I do not see why they should not be as successful here, as they are elsewhere.

Q. What result would you expect from them ?—I would expect an all round improvement in the value of the agricultural products of the country, and the introduction of many species of roots, plants, &c., that are not cultivated at present. I would also expect a very great improvement from having connected with the Central Bureau, a Department of statistics, which would show the movement of grains in the different countries in the world, and their prices. The United States have devoted a great deal of attention to this matter ; and have shown their merchants and large dealers the condition of the grain from month to month, and the markets to which it would be to their interest to forward it. Of course, if a country like France, for instance, has a full average harvest one year, it would not do for American merchants to consign their grain to Havre or Bordeaux. And the same may be said of other countries.

Q. What should be the work of such a station with respect to forest culture ?—The misfortune appertaining to forestry in this country, is that there is no reliable experience to guide you. Except in a very few cases, which are private ; there has been no attempt made to introduce foreign trees except here and there, as a matter of ornamentation, and those trees have been so specially trained and cared for that they form no criterion to guide the experimentalist. If in every Province of the Dominion they were to plant trees and to keep a record of the soil in which they are planted, and their annual growth, it would be a matter of immense value to the country. We would not then be told as we were at a meeting in Montreal a couple of years ago, by some men who have been brought up among spruce and pine trees, that pine would not become a merchantable article under a hundred and twenty years, and by others, that it would be merchantable in less than thirty years ; nor would we be told, that spruce is of a slower growth than pine, and so forth. These statements only show upon what unsound foundations people here possess upon which to form their opinions. I have no doubt that every one spoke as he believed he was justified in speaking ; but if you had Forestal Stations, the results of the labours of which would be to give the proper mode of culture of the proper tree adapted to such and such a soil, and pointing out what profits you or your children might derive from planting such and such species, it would afford a great impetus to the cultivation of timber throughout the entire country.

Q. What should be the extent of a station for forest culture?—The work could be carried on, on a very small piece of land. With ten or twenty acres you could try almost every species. However, you would have to select a spot where there would be some varieties of soil.

*By Mr. Fisher:*

Q. Would not such an Experiment Station carry on its experiments more satisfactorily by getting people in the different parts of the country to assist?—It would be the real function of the Central Bureau to do that; it would not do all the work itself but would cause it to be done throughout the Dominion.

Q. There are people of trustworthy experience who would take a sufficient interest in the work to assist such a Central Bureau as that, and at a mere reimbursement of absolute outlay, they would be very glad to make experiments and to report to the head of the Bureau the result of the experiments they make?—There are thousands of people who would be only too glad and too proud to undertake the work.

Q. People who now are making these efforts in a very undirected and disjointed manner?—Most decidedly. Such people have no guidance now, and what slight experience they may acquire is of no advantage to others; whereas if the different experiments and conditions were examined here by some central authority, and disseminated throughout the country it would be to the general advantage, and much good would be done.

Q. I suppose the fact that we are only now ceasing to make war on our forests has prevented the spread of any great interest in forestry and tree culture; in the past we have had to cut down trees to such an extent and so vigorously that it is very hard to get people to understand that the time is past for that kind of work, and that we should really commence to replant?—Of course that has been the root of the evil in this country. The tree has been looked upon as an enemy, and people have from their earliest days been taught to think that if they destroy the tree they are doing a good thing, and are removing so much encumbrance from the ground.

Q. The peopole who understand forestry have come to the conclusion that that period has gone by?—Yes. In all the well settled sections, and even in the wooded sections there have been enormous losses through injudicious cutting. Had the people acted with any judgment and knowledge they might have kept up a comparatively good supply. Instead of that, they have cut down where there was no necessity for cutting. Besides, instead of cutting only the large trees they have cut away an immense number of small ones. These were used for rafting purposes. Had they been left they would have been of value to the country, and the removal of the big timber would have been of advantage to them, because it would have allowed the light and air to reach them. But, of course, the lumbermen were not concerned in these considerations.

The Committee adjourned.

OTTAWA, 20th March, 1884.

The Committee met, Mr. GIGAULT in the Chair. Maj.-Gen. LAURIE, Halifax, called and examined.

*By the Chairman:*

Q. Would you be kind enough to tell the Committee what experience you have had in agriculture?—I should perhaps first explain how I came to appear before you. I am President of the Central Board of Agriculture for Nova Scotia, and, almost by accident, I received a copy of the questions your Committee has been circulating through the country. I submitted them at once to the Board of Agriculture, but as they had not received a copy of the questions formally, they hesitated to take up the subject. I asked them to prepare answers, as we were desirous of assisting you in every possible way in the enquiries you were making. However, they demurred at first to consider the questions, because they had not come before the notice of the Board officially, and they did not know in what way any uninvited responses to the questions might be considered by your Committee, and I then submitted the questions to the Provincial Government. We have no Department of Agriculture in Nova Scotia; the Board of Agriculture is the body really charged with carrying out the work of the Government in this branch of the public service. The Government, through the Provincial Secretary, requested me to submit the questions formally to the Board of Agriculture, and the Board of Agriculture, after considering them, requested me to put myself in communication with you, and if possible, to appear before you and give you such information as I possess in regard to these matters. We were desirous of showing how anxious we were to support your action in the direction of advancing agriculture in the way you propose. Personally, I have been engaged in farming in Nova Scotia since 1866. Of course I have not taken up farming as a means of livelihood, but I have had a good deal of experience in agriculture, and have been President of the Board of Agriculture for some eight or nine years. In that way I have learned a great deal about agriculture. I cannot call myself an expert on matters relating to experimental stations, nor have I gone deeply into scientific farming, but at the same time I have striven, as far as in me lay, to improve the system of farming in our Province.

Q. Under what difficulties does the present system of agriculture labor, and in what respect is the Canadian farmer placed at a disadvantage when competing in foreign markets?—I speak, of course, of the Nova Scotia farmers, because I am best acquainted with them. I have mixed with the farmers of that Province during my command of the militia, for the last twenty-two years. The Nova Scotia farmer labors under these disadvantages, to my mind: he has received no agricultural education—by which I mean, training in the sciences connected with agriculture, and concurrently in the application, in practice, of the knowledge so acquired. He consequently is quite unaware what his land is capable of, or how to obtain the greatest return for his labor and other outlay. Our fruit growers have given great attention to that industry, and with exceedingly good results; but with this exception, and that of a few intelligent men who, under favorable conditions, are reclaiming marsh lands, and carrying on their work profitably. The vast majority simply obtain a subsistence, and the results, consequently, are so discouraging that even when in any way money is acquired it is invested in anything rather than farm property. There is no encouragement to invest capital in farm operations, because there appears no promise of a return; consequently, improvements are not actively carried out. Hired labor is only employed at busy seasons, and being irregularly employed, the supply is irregular and uncertain; and wages are high. This reacts, and men of means are discouraged from engaging in agriculture. Our young men receive good advantages in education, but not in subjects which are directly of value to agriculture, and they go into overstocked professions, and leave the country. We require first, to fit them to remain at home and follow agriculture, for I conceive the native-born is the best inhabitant a country can have. Next, we want immigration of men of moderate capital. Farm property is exceptionally low and plentiful in the market, but unfortunately the capabilities of our Province are not well known in Europe, and hence intending immigrants do not come to us. We want men of some capital, as machinery is now a necessity, and manual labor cannot compete with it. Hence, those who attempt cultivation without machinery become discouraged and leave the country.

Q. What deficiencies have come under your notice in the cultivation of cereals; cultivation of roots and grasses, raising of stock and wool growing; production of butter and cheese; culture of fruit and the ordinary use of fertilizers?—I do not quite understand whether you wish me to say what results have attended the cultivation of those crops in our Province?

Q. What defects have come under your notice; how is the system of agriculture defective in the cultivation of cereals?—I think I have covered that question pretty well in my first answer. I could, of course, tell you what we are doing in the cultivation of the various crops, but I do not think that would be an actual answer to your question.

Q. Would the importation of seed from foreign countries benefit our farmers?—We are doing all we can to improve our seeds by this plan, but it has to be done by private parties, and it is a matter of difficulty and expense to our farmers.

*By Mr. Bain:*

Q. Have you seedsmen who go largely into that line?—No; they do very little importing themselves. We deal with Ontario seedsmen, and we find it more convenient to get our supply in this way, because we have the advantage of dealing with importers who operate on a larger scale.

Q. I suppose the field with you is not very large for the seed business?—No not large. It is supplied very largely with foreign seeds through Ontario seedsmen.

Q. What is your experience with Ontario seeds? How does the change of climate and soil operate?—Very satisfactorily.

*By Mr. Massue:*

Q. Do you grow fall wheat?—I am experimenting with fall wheat. It has been tried, and has been pronounced a failure, on account of our changeable winters. For instance, this winter we had no snow, but constant frosts and changes until about the 1st of March. The ground has not been covered with snow at all. I have 25 acres of fall grain, 2 acres of wheat, and 23 acres of rye, and I am afraid I shall lose it all. I had some Ontario wheat—spring wheat—last year, and it was a very fine crop. It yielded 25 bushels to the acre.

*By Mr. Bain:*

Q. I suppose your changeable winters caused all the trouble in fall wheat growing?—It kills it sometimes. We would have very fine crops but for that.

*By the Chairman:*

Q. Would a general system of inspection and branding be likely to enhance the value of our butter and cheese in the home and foreign markets?—Of the sales of butter and cheese, I have really no personel experience, but undoubtedly buyers would feel greater security in purchasing an inspected article, and in this way sales would be more satisfactory. Makers, also, would have a standard established which would stimulate them to aim at manufacturing an article of first quality.

*By Mr. Bain;*

Q. Has the factory system grown up with you?—Cheese factories have, but not butter. I do not think there is a butter factory in the Province.

Q. Are there no creameries?—There are no creameries, but the people of Colchester have gone into a large milk-condensing business, which has absorded the milk of the district to such an extent that it has rather paralyzed one or two cheese factories. They expect to handle this year about eight tons of milk per day.

Q. I suppose the trouble is that you can give the farmers a higher price for their milk for the condensing process?—There is not much difference in the price paid for the milk, but the same men who were formerly engaged in the cheese business have turned their attention to this work of milk condensing. We propose to turn into cheese all the milk above what we can profitably condense. I think it is pretty well established that condensed milk offers us a better market. Cheese is uncertain; if you have to keep it on hand for any considerable length of time it deteriorates. We had to hold it over, one year, and that discouraged us so much that we have turned our attention to condensed milk, for which we think we can get a steady, continuous market, and also an article of merchandise that we can hold, if we find it desirable so to do.

*By the Chairman:*

Q. Would the importation of fruit tree scions and plants from Russia and other countries under climatic conditions similar to those of Canada, be of service to our fruit growers?—Our fruit growers are now experimenting with such important species, and they expect good results from it.

*By Mr Bain:*

Q. Do you know what points they have been imported from?—I do not; I am not much of a fruit grower myself, but I have put this question to several fruit growers and their answer is too short. They only say that they are engaged in the work of importing and experimenting, but they do not say from what point they bring the new specimens.

*By the Chairman:*

Q. Would the appointment of a public analyst, to whom samples of soil and of home manufactured and imported fertilizers might be submitted, prove of advantage to our farmers?—Yes; if he was within reach, so that the samples might be sent him, and information be promptly furnished in regard to them.

Q. What do you think of establishing an experimental farm or garden where varieties of foreign grain, fruits, trees and fertilizers might be tested, and whence such seeds, plants, &c., might be distributed throughout the Dominion, would it be advisable?—The climatic conditions are so dissimilar that experiments made in the drier atmosphere and steady winter of Ontario, would be of comparatively small value to the Lower Provinces; but experiments conducted, where the conditions of season, temperature and rainfall are similar to those encountered by our farmers, would be of very great value. Our farmers are now more or less engaged in experiments, but the labor in largely thrown away, as they have not the scientific knowledge to work out these satisfactorily, and they often arrive at wrong conclusions. But if an experimental farm was established in their neighborhood they could readily join in conducting these experiments, receiving instructions from the Superintendent of the station, as to the necessary conditions and points to which they should give attention, and these simultaneous experiments would be of more value than if conducted singly. It is very desirable that branch stations should be established. Our Dominion is very large, and the climatic conditions are very dissimilar, so that a central station, without the branches, would not bring all the benefits we desire. It would, without doubt, confer great advantages, but it should be supplemented by branch stations.

Q. Have you noticed any appreciable deficiency in the crops of your district owing to the depredations of birds and insects?—Our wheat suffers from what we call the weevil, and this year the crop failed in many places. In fact, it may be said to have succeeded only where it was sown in a position where the crop would be exposed to the wind.

*By Mr. Bain:*

Q. Do you try early and late sowing, to see if you cannot fight the insects in that way?—We have tried all kinds of remedies, but so far as the time for sowing is concerned, our seasons are so short that we cannot afford to wait. I sow as early as I can; I sowed in April, last season. I am situated between two lakes, and the wind has a pretty good sweep over my land. We had abandoned wheat growing for about twenty years, but it has been resumed again in some places, and I have gone on increasing the area, till last year I had twenty-five acres.

*By the Chairman:*

Q. What crops and fruit products have suffered most, and from what classes of insects or birds?—Our wheat, as I have said, has suffered seriously from the weevil.

Q. Have your fruit trees suffered also?—They have suffered from insects—the borer and others—but as I am not prepared to give a clear answer on that point. I simply know from hearsay.

Q. What steps are taken to keep down insects?—For years the cultivation of wheat was abandoned, with the hope of destroying the germs of the weevil. Now they are beginning to grow wheat again, and the crop is becoming better.

Q. Have the timber trees of your district suffered any from insects?—Shade trees have suffered from caterpillars, but the timber trees in the forest have not suffered at all. The shade trees in the neighborhood are entirely stripped.

*By Mr. Bain:*

Q. What varieties of trees do they attack mostly?—They do not seem to be at all particular. They attack any kind of tree they can find, in the shape of shade trees, in the neighborhood of Halifax. I am told, also, that they attack forest trees, in some districts.

Q. Would you recommend the appointment of an entomologist, whose duty it would be to give information concerning birds and insects, injurious or beneficial, and the means of protecting the crops against their ravages, accomplish any benefit to the farming classes ?—Undoubtedly he would, if he was located in the neighbourhood, within reach, but an entomologist 1,200 miles away, unless he was either able to come to the insects or the insects to him, would not be of very great value. An entomologist, however, in connection with what you spoke of earlier—experimental stations—would, I think be valuable.

*By Mr. Landry (Montmagny):*

Q. Do you not think an entomologist here at Ottawa would be able to render important service, by having cases reported to him here ?—Not unless he was a witness of the damage done.

Q. But when he is acquainted with the nature and habits of the insect pests, do you not think he could give very important advice and information on the subject, even though he is far away ?—I think he would be of far greater value if he was in the neighbourhood. I think it is highly desirable to have him where he can see the workings of the insects and take measures to eradicate them and be responsible for their suppression or extinction.

*By Mr. Macdougald:*

Q. You think the field is too large for one entomologist to do good service ?—I think it would be beyond his capacity. Of course he would be of some value.

*By Mr. Landry (Montmagny):*

Q. Do you not think that if it was possible, only to employ one entomologist, and have him placed in charge of a central station, he could give information to all, through the whole country ?—I think it would be far better than to have none at all.

*By the Chairman:*

Q. Have you read a book written by Mr. Saunders, of London, Ont., on insects injurious to fruit trees and crops ?—I have not.

*By Mr. Bain:*

Q. I suppose an entomologist, situated locally, would be of use most where a local pest, peculiar to the district, should break out, because he could then go and examine the circumstances and all the conditions, and he would be able better to point out a remedy ?—Yes; and if the central entomologist is able to visit the locality he would be just as useful.

Q But take, for instance, the case of the tent caterpillar, which is found in all parts of the country and is pretty well known. In the event of a visitation from this insect to any distant part of the Dominion, the entomologist at the central station could be put in possession of all the facts by correspondence. But if it was a case in which a new insect appeared, it would be his duty to visit the locality and observe the operations of of the insect and all the conditions ?—Yes; I suppose so.

*By the Chairman:*

Q. Would it be desirable to extend the duties of the present system of veterinary inspection of stock in quarantine, and, if needful, the staff also, with a view of dealing with the local development of infectious diseases among farm stock and poultry throughout the Dominion, and the best means of stamping them out ?—Do you mean by this to ask whether or not it would be desirable to extend the quarantine stations also ?

Q. I mean, to have a veterinary surgeon employed by the Bureau here, who could visit any place and investigate diseases and give the necessary remedies for stamping them out.—You do not refer only to the importation of stock ?

Q. Not only to imported stock, but to Canadian stock also.—With reference to the question of quarantine, we have no quarantine station for animals imported from the States nearer than Sarnia. Consequently, if we wish to import an animal from Boston, we have to bring it all the way around by the Grand Trunk Railway.

*By Mr. Bain:*

Q. Where is your nearest quarantine station ?—At Quebec. We have none in the Maritime Provinces at all. If we wish to import an animal from Liverpool, we must bring it around by Quebec; if from Boston, we have to go around by Sarnia. This is extremely inconvenient; in fact, it practically prohibits importation to our Provinces. We earnestly desire that quarantine stations should be established at Halifax, and at Yarmouth also, and that the staff should be held available to visit localities where there is any doubt as to the existence of infectious diseases, and take the necessary steps to prevent its ravages. It is desirable that the veterinary staff should be composed of men of recognized ability, and that they should be made available also to enable us to import cattle direct.

*By the Chairman:*

Q. Is there in your neighbourhood sufficient standing timber to supply shade, fuel and other domestic wants?—So far there is no deficiency. We still export lumber largely.

Q. Have any steps been taken to maintain this supply, or to replant where it has failed?—No steps have been taken in the direction of replanting, but efforts are made to prevent the destruction of forests by carelessly setting them on fire. We have suffered very much from the burning of our forests.

Q. What do you think of the establishment of a Central Bureau here, in Ottawa? I think it would be of great value, but I would urge strongly, as I have done already, that it should be carried on in connection with local branches, so that the proposals in reference to the employment of a public analyst, entomologist and veterinary inspector, and the establishment of an experimental farm or garden, could be the better considered and carried out. I think the Central Bureau would be of very great value, but it should have branches to do the work you desire to aim at.

Q. Do you not think that the branches should be established by the Local Governments?—The great difficulty is the lack of funds on the part of the local authorities to carry out such a work. I have been pressing upon our Provincial Government to do something in this direction, but they find a difficulty in the question of means.

Q. Would the dissemination of handbooks and reports containing the data thus collected, on culture, stock-raising, dairying, poultry keeping, &c., have a beneficial effect?—I should say, yes; most decidedly; provided the information afforded, had consideration to local circumstances, and did not attempt to prescribe what was desirable for all localities from experience obtained in any one only.

*By the Chairman:*

Have you studied the working of the Central Bureau at Washington?—I have not.

Q. Would you recommend the formation of a section devoted to agricultural statistics?—I think it would be of very great advantage, in keeping our farmers informed when to sell and when to hold; would check them from over-producing particular crops and stock, and glutting the market; and would keep prices steady, and hinder fluctutation and speculation. It would enable them to know how best to dispose of their produce. As an illustration, the farmer would always be in a position to feed his grain crops when prices are abnormally low, and the statistical returns would inform him if the fall was temporary or from local causes, and whether or not it was likely to remain steady throughout the year.

Q. Would the issue of monthly bulletins and abstracts, containing such information, be of sufficient advantage to warrant their publication?—I think it would complete the services rendered by a statistical bureau.

Have you any further suggestions to offer?—No; I think the questions that have been asked have covered the ground pretty completely.

*By Mr. Landry (Montmagny):*

Is there any agricultural industry in your Province in operation?—We have a cheese factory, and a large condensed milk factory.

Is there not a starch factory?—No; I do not think there is a starch factory in the Province in operation. We have some meat canning establishments which are in operation in Cape Breton, and I know they are canning fruit in the Annapolis valley, and also corn and tomatoes, but it has only lately commenced, and it has not attained to very large dimensions as yet.

Have you any beet sugar factories?—No; we manufacture our sugar by catching fish: that is, we catch fish and send them to the West Indies, and bring back sugar in return.

*By the Chairman:*

Q. Have you only one condensed milk factory?—Only one and it was started last year.

*By Mr. Massue:*

Q. Does it pay?—Yes; it is paying 8 or 10 per cent., which is pretty good for an experiment.

Q. Do you think it is better than cheese making?—The condensed milk factory was started by a company, the shareholders of which, are largely those who compose the company who are engaged in cheese making. They have suspended operations to go into the condensed milk business, so that it must pay better.

*By Mr. McDougald:*

Q. I suppose there is less competition in the condensing business?—I think, from enquiries that I have made, that the principal inducement was that there was a more certain market.

*By Mr. Massue:*

Q. Where do they find a market?—At Winnipeg; and with the trade generally.

Q. Have you any agricultural schools in your Province?—We have not, but we very much desire to have one.

Q. You believe it would help agriculture very much?—I think your proposition for an Experimental Station should be associated with an Agricultural College. The Experimental Station, the model farm, and the institution for imparting agricultural education seem to be bound up together, and are very necessary in our Province.

Q. Don't you think those colleges should be founded by the Provincial Government?—I am afraid that if they are not established by the Federal Government they will be delayed, in some cases, for a considerable length of time. I think the Ontario Agricultural College is an institution of great value, and a great number of young men from Nova Scotia are attending it. I consider that institution, and the farm in connection with it, are a fair sample of what the other Provinces should do in this direction. The prospectus and the theory of the institution could hardly be improved; the practical carrying out of the principles taught there, depends upon the young men who go for instruction. Circencester College, in England, is largely attended by the sons of gentlemen, who bring their horses with them and go out hunting occasionally. At that institution young men are trained more to become managers of estates and gentlemen farmers than anything else. There, the inducements held out to become farmers have been such that I have known men of my own profession sell out their positions in the army and engage in farming for pleasure, but in a year or two, when the price of their commission was gone, and they found that they were loosing money, they would denounce farming pretty strongly, and say that it did not pay. They were not practical farmers.

Q. I think one objection to experimental farming being engaged in by ordinary farmers is that it is expensive?—Yes; and they have not time, amidst the hurry of seeding and harvesting operations, to attend to experimental work properly. In reference to agricultural colleges, we have, unfortunately, five degree-conferring colleges in Nova Scotia. One of those colleges has attached to its curriculum faculties for obtaining instruction in law and medicine, and we have been urging that some other college should take up agriculture, but we are met by the statement, from all who have examined the subject, that agricultural faculties attached to arts colleges have invariably been failures.

*By Mr. Bain:*

Q. I presume there would be no money in them at all; that is, the revenue to arts institutions is generally provided from outside sources?—I think so; but still we suggested that the agricultural part of the college should receive assistance from the Government, but it should be associated with existing colleges, so as to take advantage of their machinery, in the shape of lectures, buildings and staff. From all sides, however, we have been advised not to proceed with this scheme. I believe there is no reason why an agricultural faculty could not be attached to one of our colleges, at an expenditure of $3,000 or $4,000 per annum. This would supply one professor of agriculture, a veterinary professor, and a farm manager. I believe that, of all things, it is necessary that theory and practice should go hand in hand in this work.

*By Mr. Bain:*

Q. I know, on the American side, they have separate agricultural colleges with special endowments, but some of them seem to be failures; there seems to be something in the details of management which affects them; so much depends upon the practical manner in which they are managed, unless it is practical the college is unsuccessful, and it seems to be difficult to combine practical agriculture with successful management?—I am sure there are difficulties to be met with; but there is a greater difficulty than that you have mentioned; it is the difficulty of obtaining special endowments for special colleges. In view of that, the question arises whether the plan of teaching agriculture is not the better one.

Q. Especially when you have a farm that might be worked?—Yes. The fear is, of course, that the professors would have to perform extra work, but that is a matter of detail. Agricultural education is now become of first importance.

Q. In the older Provinces we have arrived at the time when machinery has to do the work formerly done by hand, and to make his business successful, a man has to look before him?—Yes. An experiment station, valuable as it would be, would not, to my mind, satisfy the wants unless it was associated with practical training, so that you could teach the individual farmer how to utilize the information you would give him. It seems to me that giving the results of experiments without showing the farmer how to utilize them would be like telling a man merely the names of drugs and putting him into a drug shop to prescribe from any bottle he might choose to select.

*By the Chairman:*

Q. Journals of agriculture published in France, Germany and England seem to be under the impression that experiment stations are practically agricultural colleges?—They should be necessarily allied, one with the other.

Q. They seem to be under the impression that these stations are educational, because they speak of the good results to science combined with practice there?—A man who conducts an experiment station should be competent to impart instruction to others. You utilize his services to a larger extent by combining the two.

Q. They ought to have practical experience before you put them in charge?—Yes; and they might as well communicate their knowledge to others.

*By Mr. Bain:*

Q. Then the conditions in France and Germany are different to ours. Their country is an old one, and has been settled for generations; ours is comparatively new?—Still the increase in the demands upon agriculture are so great that unless we obtain the utmost from our land we are working at a disadvantage. The yield will not pay for the labor now-a-days unless we obtain full crops.

Q. Then there is another thing; we must be content to change our system, in view of the development of the newer portions of the country; take for instance, wheat gowing; we might grow enough for our local wants, but it is a question whether it would not be as well to allow the North-West to grow wheat for exportation and for the Eastern Provinces, which have such good shipping facilities to raise stock; I fancy, in the older Provinces, we will have to go more into specialties as time progresses?—Yes. Did you notice Mr. Gladstone's latest advice to the farmers in Cheshire. He told them that in view of the competition in wheat and stock-raising coming from Canada and the United States, those lines of agriculture would soon be things of the past with them, and the best thing for them to do is to go into the making of jam.

Q. I notice that, around Hamilton, the farmers are doing less every year of general farming and are going into specialties. Take pumpkins; they used years ago to grow a few to feed to the cows, but now they grow them in quantities for the canning factories. Even four or five miles from the city, the farmers are leaving everything else to grow them. In fact, they are rapidly moving in the direction pointed out by Mr. Gladstone, as that which the farmers of Cheshire should take?—Yes. The best farming districts are now being devoted to fruit; and our farm product would fall off materially if special lines of products were not adopted.

Q. Farmers must adapt themselves to circumstances, or as the saying is, they will be left?—Yes.

The Committee adjourned.